Service Quality Regulation for Ontario Electricity Distribution Companies: A Discussion Paper

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Executive Summary

Background

Service quality regulation is a part of economic regulation. A consideration of just and reasonable rates should, as one aspect of rate setting, consider the quality of the product or service being delivered. Under traditional Cost-of-Service regulation, service quality was often dealt implicitly as one component examined through regular rate applications. As such, it may not have been regularized – there was no standard set of indicators that were agreed upon as being important and representative of service, or associated targets set as being indicative of adequate service performance. In some industries and jurisdictions there has been an effort over time to regularize service quality regulation. While quality of service is still considered as one input into rate setting, quality of service is monitored through regular reporting, similar to the filing of annual financial results and other information.

From the mid-1980s, there has been an acceleration of adoption of alternative forms of economic rate regulation, generically known as Performance-Based [Rate] Regulation, or PBR. The concept of PBR is to provide incentives for the firm to search for and implement efficiencies, which are then shared between ratepayers and the firm's shareholders. Service quality regulation is generally considered more important under PBR, to ensure that the incentives to seek efficiencies of PBR do not result in service degradation through cost-cutting.

The Board recognized this in the development and adoption of PBR for electricity distribution rates in Ontario. However, there was much going on in the restructuring of the Ontario electricity sector, and the first-generation PBR plan was, in many respects, "transitional". This included service quality regulation. That there should be service quality regulation was not widely contested; discussion dealt with the details.

As this was the first stage of formal service quality regulation, with many firms having to implement necessary measurement plans, while others needed to modify existing ones due to restructuring activities, the Board accepted a list of service quality indicators ("SQIs") that it would require the electricity distributors (local distribution companies or "LDCs") to report. For most SQIs, the Board approved standards of minimum acceptable performance. For the reliability indicators, the Board did not set standards, but specified that LDCs with historical data should perform within the range of the previous 3 years. The Board directed that LDCs report once annually, but with separate monthly performance for the prior report year.
However, the Board did not decide on other aspects of service quality regulation at that time, as it felt that "an appropriate assessment of these matters [could not] be made until the Board and the industry have gained experience with the application of PBR plan ... and appropriate service quality performance data becomes available." (Decision with Reasons RP-1999-0034, para. 5.0.27) The Board also decided that some other aspects of service quality regulation, such as other indicators like MAIFI, or Momentary Average Interruption Frequency Index, required further investigation.

Ontario electricity distributors have now been reporting their service performance for three years (2000 to 2002). The Board is monitoring the data. There has been a marked improvement in the completeness of reporting over this time; however, an examination of the data as well as discussions with LDC staff raise concerns of consistency of SQI definitions and measurement. Staff have also been working with consultants to monitor developments in service quality regulation in other jurisdictions and regulated industries.

Board staff, as directed by the Board in the RP-1999-0034 Decision, are conducting research work for the development of a second-generation PBR ("PBR II") plan. A review of service quality regulation, to examine performance on the reported SQIs as well as to examine other issues (such as those discussed above), was identified as one component of PBR II development. On August 14, 2002, the Board announced a one-year extension of the initial PBR plan to allow more time for development of a comprehensive PBR II plan.

In late 2002, the Ontario Government legislated a freeze on electricity rates. For certain customer classes, the commodity rate is set at 4.3¢/kWh, and transmission and distribution rates are frozen at current levels. The freeze is to last until May 1, 2006. The rate freeze affects the timing for PBR II implementation. However, it does not alter the Board's mandate for regulation of service quality.

On August 29, 2003, the Board announced the initiation of a review of Service Quality Regulation for electricity distribution. This initiative was assigned file number RP-2003-0190. Under this initiative, Board staff will conduct a working group, with representation from the industry and other stakeholders, to consult on and make recommendations for a more comprehensive SQR plan. The recommendations of the working group will be inputs for a proposed SQR plan, with this proposal being subject to review through a public regulatory process.

To facilitate the work of the working group, Board staff have prepared this discussion paper. The paper aims to document principles underlying service quality regulation (section 2), and its application – both in the Ontario electricity sector and elsewhere. Section 3 provides a discussion of the restructuring of the Ontario electricity industry from 1999 to date, with section 4 summarizing service quality regulation as implemented in the first-generation PBR plan. Section 5 discusses in detail the key issues (summarized below) that Board staff have identified for consideration in the SQR review. Other issues may also be identified through the Working Group.

While these key issues are largely derived from those issues identified in the RP-1999-0034 Decision, as well as from the experience of three years of service measurement and reporting, Board staff have recognized the value of reviewing the experiences of other jurisdictions and regulated industries. While the plan must, ultimately, fit the Ontario electricity sector, the experiences of how other jurisdictions, in electricity and other regulated network-based industries such as natural gas and telecommunications, have implemented service quality regulation, can help to identify SQR-related issues and options for addressing them. The

Appendix of this paper provides a summary of selected SQR plans implemented elsewhere.

The information in this document – on principles of service quality regulation, and on its development and application in the Ontario electricity distribution sector, and on its application in other jurisdictions and industries – is intended to provide greater understanding of service quality regulation, and hence to facilitate more informed discussion of issues pertaining to service quality regulation.

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1.0 Introduction

One of the guiding objectives of the *Ontario Energy Board Act, 1998* (the "OEB Act"), that the Ontario Energy Board (the "Board") must consider in carrying out its objectives, is:

> "To protect the interests of consumers with respect to prices and the reliability and quality of electricity service." (s. 1, objective 3)

The Board is also mandated, under section 57 of the OEB Act, with approving or fixing "just and reasonable" rates. As is discussed further in section 2.0, a determination of just and reasonable rates must, amongst other factors, take into account the quality of the product and service. Section 83 of the OEB Act states that:

> (1) The Board may establish standards, targets and criteria for evaluation of performance by transmitters, distributors and retailers.
> (2) The Board may have regard to the standards, targets and criteria referred to in subsection (1) in exercising its powers and performing its duties under this or any other Act in relation to transmitters, distributors and retailers, including establishing the conditions of a licence.

Thus, service quality regulation is a legitimate part of the Board's economic regulation of the electricity sector. It is also a consideration in the Board's regulation of natural gas.

The Board is not unique; the situation is analogous for most regulators with respect to the industries that they oversee. However, service quality has traditionally been dealt with implicitly as part of regular rate and revenue requirement applications characteristic of Cost-of-Service ("CoS") regulation. Explicit recognition of service quality regulation as an identifiable component is more recent in most jurisdictions, and often coincides with restructuring and adoption of Performance-Based Rate Regulation ("PBR"). This is not surprising.

Performance measurement has increased since the late 1970s and the 1980s (as one aspect of approaches such as Management Science and Total Quality Management). Technological developments, in customer information systems, telephony, and computer-based forms of record management, have facilitated performance measurement.

The adoption of PBR has also resulted in an increased emphasis in service quality regulation, on the basis that PBR, in incentivizing firms to seek productivity improvements, could result in cost cutting that degrades service quality. Service quality regulation is thus seen as an important component of PBR, acting as a counterweight to ensure that efficiency-seeking incentives of PBR do not inadvertently result in degraded service.

The Board, in recently adopting PBR for natural gas and electricity distribution, has adhered to this approach. In all PBR plans adopted by the Board to date, there is explicitly a service quality component consisting of a selected set of service quality indicators ("SQIs") that must be

reported to the Board. With some exceptions, each SQI has a corresponding standard that corresponds to the minimum acceptable level of performance. The intent is that the Board will monitor a utility's performance, to ensure that a utility maintains adequate levels of performance or to check the utility takes timely and effective action to remedy any service degradation. As necessary, the Board will use other regulatory tools, such as investigations, for assessing compliance with terms and conditions of a licence; the results of an investigation could result in a compliance action such as the issuance of an administrative penalty.

However, the first-generation PBR plan adopted for rate regulation of Ontario's electricity distributors in the Board's RP-1999-0034 Decision was more "transitional" in nature; PBR was new to the Board and to the industry, and the Board had recently assumed regulation of electricity. Electricity distributors had not previously been subject to formal service quality regulation by Ontario Hydro. There were also numerous changes occurring to restructure the Ontario market for eventual competition in generation and marketing of electricity. There was a large number of distributors – approximately 250 in mid-1999 – of differing sizes, operating under varied circumstances, and with different structures and capabilities. A number of utilities, particularly smaller ones, did not have extensive measurement systems in place in 1999.

Thus, while the Board included service quality regulation as an integral part of the first-generation PBR plan, it did not implement all of the above aspects of service quality regulation. It established an initial set of reported SQIs, most with approved standards, and established reporting requirements. However, the Board did not formally establish regulatory responses to below-standard performance – including penalties and/or rewards – as it felt that both it and the industry needed to gain experience with utilities' performance – particularly under PBR.

In recognizing the "transitional" nature of the first-generation PBR plan, in the RP-1999-0034 Decision the Board directed staff to conduct further research, and indicated that there would be a review of service quality regulation as part of the development of a second-generation PBR ("PBR II") plan. As defined in the Decision, this review would include, but not be limited to, an examination of the existing indicators, standards and reported performance, certain additional (or replacement) indicators, and regulatory responses to below-standard performance.

Since the RP-1999-0034 Decision was issued, there has been much activity in the industry, with the competitive market opening on May 1, 2002. There have also been legislative changes. The Government passed legislation, first in June 2002 to enhance consumer protection with respect to energy marketing, and then in November 2002 to freeze both commodity and transportation (transmission and distribution) rates, until 2006. Following a review of the Board beginning in late 2002, the Government proclaimed in August 2003 further legislation affecting the structure and operations of the Board, with the aim of enhancing its ability to regulate the Ontario energy sector. These several changes have had direct impacts on the Board and on the industry.

The legislative changes have not altered the Board's responsibility "to protect the interests of consumers with respect to ... the reliability and quality of electricity service." The Board is proceeding with the planned review of service quality regulation, and has authorized Board staff

to commence consultations with the industry and other stakeholders to further develop service quality regulation. These consultations will result in a proposal that the Board will consider in a subsequent regulatory process. Ultimately, the Board will determine the most effective and efficient service quality regulation plan, considering the risks and impacts on the industry, ratepayers and society, and that supports fulfilment of the Board's mandate.

This discussion paper is intended to facilitate the evolution of SQR in Ontario. By reviewing principles and issues of service quality regulation, the current situation in Ontario, and by looking at how service quality regulation is implemented in other jurisdictions and industries, the paper educates stakeholders on the issues. It informs of what could be done as opposed to advocating what should be done. It is a starting point for an informed review of service quality regulation of Ontario's electricity distribution sector, and development of a more comprehensive, effective and efficient SQR plan.

2.0 Principles of Service Quality Regulation

In this section, we detail various principles that underlie service quality regulation. These principles are taken from research into both the theory and practice of service quality regulation. These principles are generic in nature, although comments are provided, in some instances, on how they relate specifically to electricity distribution.

A reason for dealing with these principles up front is that an understanding of these issues aids in understanding the service quality reporting currently being done by electricity distributors – as part of the first-generation PBR plan – as well as to understand the issues that should be explored as part of the review of Service Quality Regulation.

2.1 "A consideration of just and reasonable rates must take into account the quality of the product or service to be provided."

This basic premise underlies the concept and application of quality of service regulation.

Quality/price combinations: Differences between competitive and monopoly industries

In a competitive market, where customers have choices, including the option of forgoing purchase and consumption, customers will indicate their quality preferences, along with the prices that they are willing to pay to receive certain levels of quality. Firms must jockey to meet customers' needs and expectations with respect to acceptable price/quality offerings. Those who succeed in offering the levels of quality that meet (and even exceed) customers' requirements at prices that they are willing to pay for will attract customers; those who do not will lose customers and market share.

In a monopoly market, there is only one supplier. Frequently, there are more limited choices for quality/price combinations. However, even here customers will express their satisfaction with the quality of the product or service relative to their needs and expectations and relative to the offered price by their willingness to buy, and how much. If the product or service is unsatisfactory, they may forego it or seek a substitute. A customer who does not like Via Rail's offerings may choose to use bus or plane instead.

However, the ability of customers to alter their consumption, even going so far as to replace the service with a substitute, lessens for utility services. Many of these services are "essential", or nearly so, for modern living. Water, electricity, natural gas, telecommunications, and roads are sometimes referred to as *infrastructure* industries, referring not so much to the "networks" connecting customers to supply and over which service is provided as to the fact that these services constitute the fundamental infrastructure on which modern society and the economy depend.

One attribute of these infrastructure industries is the commonality of the network for serving customers. Just as cars and trucks share the road, customers share the electricity grid for the

transportation of electricity. The electricity commodity itself is also homogeneous, similar to the case in water and natural gas. These attributes constrain the ability of the firm to provide differential quality to customers. Once the firm constructs and operates the grid to certain parameters, customers basically receive the same level of service (with respect to the distribution and transportation of electricity). Some differentiation is possible, with respect to interruptible customers (where there is often a financial incentive for the increased risk of being interrupted to maintain service to other customers). The other area where the firm can differentiate service is in "customer care" or customer handling – billing, collections, enquiry handling, etc. However, on the whole, the challenge facing the firm is to design, construct and operate the network so as to be able to provide adequate service levels to the various needs and expectations of customers while recognizing the commonality of the network.

Quality of service as part of economic regulation

Service quality regulation is integral to economic rate regulation, to setting "just and reasonable" rates. From the perspective of the users or customers of the service, there must be a consideration of the "value" of the product or service, where value is defined as the product or service meeting or exceeding the needs and expectations of customers relative to the price charged. From the perspective of the regulated firm supplying the product or service, the regulated price must be sufficient to cover the costs of providing the product or service at least at the minimum acceptable level of quality, including the opportunity, if applicable, to earn a reasonable rate of return on its shareholders' investments, to cover its debt obligations, and to raise further capital as needed.

Traditionally, Cost-of-Service ("CoS") regulation has been used for setting rates for economically-regulated firms. This involves reviewing capital investments and operating expenses, with respect to necessity and prudence, and factoring in debt servicing and a reasonable return on shareholders' equity given the business risk of the firm. Such reviews occurred periodically – often annually. Service quality could be reviewed as part of the revenue requirement and rate application, with consideration of how existing operational expenses and planned capital investments would contribute to the maintenance or improvement of service quality. Poor service quality could also be a factor considered by the regulator in reducing the allowed revenue requirement (without exacerbating the situation by the utility cutting costs and services in response to reduced revenues).[1]

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[1]While service quality was a factor considered in CoS regulation, this often did not entail formal reporting and monitoring. The relative – often annual – frequency of rate applications meant that service was reviewed without long lags. Service quality measurement was also evolving since the 1970s in light of technical improvements and management approaches. Also, the "rate base" concept of CoS regulation, some argue, provides an incentive for the firm to over-invest and provide "gold-plated" service, and so service degradation is thus seen as less of a risk under CoS regulation.

Beginning in the 1980s, there has been a migration to PBR forms of rate regulation, including price and revenue caps. PBR differs from CoS in that it provides incentives for a firm to improve its productivity, with an opportunity to share the gains from productivity improvement with both customers, through service improvements and service cuts, and with investors, through increased profits. Theoretically, PBR acts as a closer proxy to the market forces that firms in competitive markets face.

Typical PBR rate setting mechanisms are more formulaic, allowing for upward pressures from input price inflation but offset, at least in part, but productivity gains. Other factors, such as growth or exogenous factors (tax rates, etc.) may also be factored in. Another advantage to PBR is that the formulaic approach to rate adjustments under PBR should also contribute to more efficient regulation, with less frequent detailed reviews to reset plan parameters.

With less frequent detailed reviews, there is an increased need for ongoing monitoring of service performance, to ensure that any problems that do occur are addressed in an effective and timely manner. Also, the incentives inherent in PBR for the utility to seek productivity improvements, could result in cost containment that results in degraded service. Service quality monitoring serves as a counterbalance to ensure that adequate service is maintained.

In some PBR plans, either explicitly or implicitly, the service performance of the firm may be a parameter affecting rates or revenues. A Q-factor (see section 5.1.3) affects the price or revenue cap explicitly. In other plans, aggregate penalties, or the existence of service guarantees and rebates, link the firm's financial performance to its service performance, but do this separately from the PBR mechanism.[2]

A consideration of service quality is thus integral to regulatory rate setting. However, service quality regulation can, to some degree be separate from rate-setting. While appropriate indicators and standards must be consistent with the needs and expectations of customers, these may be determined, or at least heavily influenced by technical considerations – engineering standards, technology choice. While different customers may have differing needs and expectations, the commonality of the network places constraints as to the extent that the utility can "differentiate" the core business of electricity transportation and distribution for different customers. The firm's management and engineers will seek to design, construct and operate the network, economically, to meet customers needs adequately. While customer needs and expectations are a key input for the design and operation of the network, the availability, capabilities and costs of the technology, and the commonality of the network will also influence operating standards.

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[2]Where there is a financial consequence of service performance, it is important that the measures focus specifically on aspects of service that are under the utility's control. Restructuring, involving separation of energy generation and marketing from monopoly transmission and distribution, generally complicates this.

2.2 *"What is reported should be a representative subset of performance measures used by the firm to manage its own operations."*

This concept captures many key features of service quality regulation.

Consistency and accuracy

It is important that the regulator, the firm and customers have an accurate and consistent picture of performance. If the firm and the regulator (and the public) look at different measures, there is the possibility of confusion and inefficiency. The regulator may perceive a problem while the technical, operational measure used by the firm indicates no problem. Where there is an issue, the firm may manage to improve performance as represented by one indicator, while the public and regulator may perceive that there is no improvement as evidenced through another measure.

Minimizing the cost of regulation

Relying on indicators that the firm itself measures to effectively manage its internal operations also has a benefit of reducing the cost of regulation. The costs of indicators already being measured for management purposes are a "cost of business"; the incremental cost is then solely that of reporting to the regulator.

Types of SQIs

At the same time, the measures must also reflect the service delivered to and experienced by customers. They must be the "right" measures – in that they accurately represent aspects of service that are important to customers.

Measures of customer satisfaction obtained through surveys, or customer complaints, provide direct expression of customers' perceptions of service performance.

Technical operational measures, such as telephone response, appointments met and service reliability, are next in line as they measure the level of service delivered to customers rather than customers' perceptions of whether the level of service is adequate. However, there should be a relationship between the technical level of service delivered and customers' satisfaction with that level of service. As service performance improves, customer satisfaction should improve. The exact relationship may not be simple to express formulaically (it will often not be linear over the range) and relates to aggregate performance and customer satisfaction; individual customers have their own perceptions of what constitutes "adequate" performance. Technical indicators are often cheaper and easier to measure, and are often already used by many firms to manage operations.

Where technical or operational measures are used, they should be those that directly relate to the service delivered to customers. Indirect measures, while reported in some jurisdictions, are less accepted. While good performance in employee training, accident rates, or employee health and

safety, should facilitate improved service delivery, there is no guarantee of this. Better training of employees should improve customer contact skills, and lower absenteeism should facilitate better resource planning and, for example, fewer missed appointments; however, training of support and administration staff or engineers may have no direct impact on customers. Lowry and Kaufmann (2000), along with others, provide further discussion on this.[3]

A representative subset of indicators

The final aspect of this principle is that the performance measures routinely reported and monitored for regulatory purposes constitute a representative subset of those collected and used by the utility for its own purposes. This reflects the view that the proper role of the regulator is not to "micro-manage" the firm – to duplicate the role of the firm's management and directors. Instead, the regulator needs sufficient information to be able to gauge whether the firm is operating properly. The regulator does not need all of the same data; instead it needs to rely on a subset of that information – but one that also gives a true picture of the firm's performance. If and when the regulator senses that there is an issue that the utility is not responding to and managing properly, the regulator will act. The regulator may require the production of other information as part of its investigation of a service deficiency of issue, but this additional information on a regular basis.

Having only to report on a summary basis thus helps to reduce the cost of regulation. The firm has to report less, and the regulator also needs fewer resources for monitoring.

The challenge is then to identify a suitable subset of indicators that should be sufficient for regulatory purposes. There is also a risk that these may subsequently prove to be less than representative, as the firm could focus on these "official" aspects of service quality at the expense of others. In this regard, monitoring of customer complaints, including analysis of the nature of complaints, can serve as a backstop to this happening. Customer complaint data can serve not only to corroborate the reported service quality, but also to detect issues on other aspects of service whose performance is not being reported explicitly. This is further discussed in Section 5.2.8.2.

2.3 Reporting and Publication

The firm measures its performance and (presumably) monitors and acts on its performance results. However, from the regulator's perspective, it desires (and its authorizing legislation may require it) to monitor the performance levels to ensure the adequacy of performance, to identify problem areas and to check that any such detected are then addressed appropriately by the firm.

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[3]The Board also rejected reporting of health and safety measures in its RP-1999-0034 Decision with Reasons on the basis that health and safety is regulated by other government agencies. Additional oversight by the Board may be both inefficient and ineffective. However, health and safety are monitored in some jurisdictions.

Thus, the regulator also has a need to review the firm's service performance, meaning that the firm must report it to the regulator.

Cost of Service Regulation

Under traditional cost-of-service regulation, service performance results could be reported as part of a revenue requirement or rate application, where the reported performance would be one factor considered by the regulator making its determination regarding applied-for rates. This has been the norm. Under this approach, service quality is regulated implicitly through regular rate applications. The utility was motivated to maintain service performance, as service degradations could be scrutinized in a subsequent proceeding, and could factor into the regulator's decision.

Performance-Based (Rate) Regulation

While dealing with service quality implicitly through rate applications may have sufficed under traditional cost-of-service regulation where such applications occur on a regular basis, an alternative approach of reporting service performance at regular intervals is becoming more frequent. Regularizing reporting has many advantages, particularly where there is a move to PBR forms of rate regulation. Less frequent rate applications or, under PBR, more formulaic approaches to rate adjustments, are becoming more common. Major proceedings occur less frequently, and less information is typically needed for formula-based rate adjustments. Regular reporting ensures that the regulator still receives the data, on a timely basis, so that it can monitor the industry, and identify and react to issues before they become either stale or uncontrollable. Regular reporting outside of the application process can also distance reporting from the adversarial environment – interrogatories, witnessing and cross-examination – traditionally characteristic of regulatory proceedings.

The parameters that must be specified for regular reporting include:

- frequency of reporting;
- periodicity of reporting (such that the periodicity of the reported data must be less than that of the report frequency);
- format of report (including if electronic reporting is possible or required); and
- report details.

Publication of SQIs

A related issue involves publication – or at least public availability – of the reported service performance data. While a primary purpose of the regulator is to monitor the firms in the industry and to react to service issues in fulfillment of its own mandate, a common ancillary intent in some jurisdictions is to inform the public.

This is an area that was historically less-developed under traditional CoS regulation, as customers had no choice on who was their supplier. Customers who have only experienced the

service of one utility have difficulty in evaluating whether they are getting good service or not. With the move to performance-based forms of regulation, often premised to proxy competitive market forces, the focus is now on utilities being motivated to perform – not only in terms of cost efficiency, but also in terms of quality.

Public reporting of service performance can give customers an appreciation of how well their distributor is performing, both in absolute terms and relative to similar providers. In turn, comparisons can motivate poor performers to try to improve, and often good performers may want to maintain their relative advantage, while taking into account impacts on costs and profits.

Public reporting of service providers is established in the U.K., Australia, Canadian telecommunications, and in the U.S., both for federal and many state jurisdictions. Such publication can provide pressures for poorer performing firms to improve service – either through the "peer" pressure of industry-wide comparisons, or from the direct pressure of customers and other stakeholders questioning why they should be receiving poorer service. The format of public reporting and availability differ widely across various jurisdictions.

Balanced against the issue of publication are arguments about confidentiality and commercial sensitivity of the service performance data. For regulated monopoly service providers, service performance data is generally considered public. Review of service reporting regimes in other jurisdictions and industries supports this view, although there may be a bias – public reporting is easier to identify because it is publicized. There is a more fundamental consideration that, where the firm is a regulated monopoly, it does not face direct competitive pressures and so does not face specific direct harm (i.e. due to a loss of market) from publication of the data.

If service quality is to be reported, the means of public reporting needs to be considered. Traditionally, reports were filed in paper form. Parties wishing to examine them had to visit the regulatory agency or the utility. There has been increasing use of electronic reporting and publication, beginning in the late 1980s. The Internet facilitates widespread access to service performance data, and is increasingly used in various jurisdictions for both data collection and dissemination.

Another facet of reporting is the publication format and content. Utilities report their own performance to the regulatory agency. Historically, paper reporting was the norm, but this is increasingly augmented or replaced by electronic reporting. One advantage of electronic reporting is that analysis and aggregation of data is easier when the data is available electronically. In some jurisdictions, staff of the regulator may do some analysis in aggregating the reported information from the regulated firms. Combining and analyzing data may aid in public understanding, but analysis in particular raises the prospect that such analysis may add some bias in how a utility's performance is portrayed or interpreted. There is also the resources required for such compilation and analysis, and whether this use of resources (particularly regulatory staff) is justifiable. In Australia, annual staff reports from state commissions tend to include analysis, while North American jurisdictions seem to favour publication with little, if any, supplementary analysis.

2.4 The role of standards and other thresholds

It is not just enough to know what the performance is. Just as important are assessments of whether the performance is adequate: How is performance trending? Is it improving or deteriorating? How does one utility's performance compare relative to similar firms?

Qualitative versus quantitative indicators

A first consideration is whether the reported quality measure is quantitative or qualitative. Quantitative measures are those measured numerically. Percentage of customer appointments met is a quantitative measure determined as the ratio of the number of customer appointments where the appointment was met as scheduled to the total number of appointments. Qualitative measures are less specific in terms of their measurement. While they can impart information identifying service issues, they are less informative regarding the severity of the service issue.

Even measures that seem quantitative may be effectively qualitative. As is further discussed in Section 5.2.8.2, counts of customer complaints may be misleading. Because of real or perceived importance, or the volatile nature of certain issues, customers are more likely to complain about some issues than about others. The incidence of complaints may be influenced by other matters, such as media attention or an announcement of applied for rate increases. Complaints may be best seen as providing important, but ancillary and corroborative, *qualitative* information about service quality rather than being a true quantitative measure of service quality.

Time trends

For quantitative measures, adequacy can be assessed in several ways. First, performance can be assessed over time. This can be done as a trend, or by comparing current performance to a threshold based on historical performance. The intent is that performance is at least maintained relative to historical levels; or, if historical performance is considered inadequate, a certain degree of improvement may be expected over time.

Yardstick comparisons

A second method is to compare performance against that of other firms. With around 100 licensed electricity distributors currently operating in Ontario, "yardsticking" of service performance is conceptually possible.

However, yardsticking appears to be little used (at least for regulatory purposes) in other jurisdictions and industries. There are a number of reasons for this. First, in most other jurisdictions, the number of regulatees is small, and so there are few firms to compare performance against. Second, these firms are, with few exceptions, local monopolies and hence operate in different areas. Geographic and environmental differences are legitimate sources of variation in performance. Finally, there are many differences in how various utilities measure their performance – even if the indicator is industry-wide. In many cases, differences in

measurement may reflect differences in technology (in operations or in measurement methods) or different management and operational practices (inclusions/exclusions). These differences are often not apparent, and are widespread in industry-wide measures such as Telephone Service Factor ("TSF"), SAIDI and SAIFI as well as in less common measures.

Predefined or set standards

The final, but most common, approach is to compare performance against predetermined thresholds. The most common approach involves assessing performance against a standard – a threshold set at what is considered to be the minimum level of acceptable performance. Other thresholds may also be established. (Further discussion is provided in Section 5.2.7.)

The basis for setting standards and other thresholds is variable. Historical performance, or industry-wide performance, can be used. Regulatory standards may be based on technological or engineering requirements. Studies of customer needs and expectations, correlated with customer satisfaction, may also be used to establish standards and other thresholds. Mathematical and statistical analyses is often used to make standard-setting seem more scientific and less "arbitrary", and can be useful to establish upper and lower thresholds (which may be based on the concept of being *x* standard deviations above or below, for example, the historical mean). However, judgement frequently enters into standard-setting – to balance what seems to be adequate for customers with what the utility should be able to provide, given allowed rates and allowing for "normal" operational variability reflecting environmental factors (i.e. weather, fluctuations in demand) that are beyond the firm's control.

Finally, standard setting must be done in the context of the intended use of the standards – particularly with regard to the regulatory responses that may be invoked if and when performance meets, or fails to meet, a certain threshold. Where meeting a standard has a financial consequence, such as a reward or penalty, the standard must be set to provide an appropriate incentive balancing the risk to the utility and to customers.

In general, service quality indicators should have standards, although there may be cases where a standard is not appropriate. As discussed in section 5.2.8.2, arguments can be made that customer complaints should not have a standard. "Indicators" that are tabulations of data may also not have associated standards.

Performance is typically expressed in"normalized" terms (such as the percentage of appointments met) to facilitate setting of, and comparisons against, standards and other thresholds. Normalization also facilitates comparisons between utilities and over time.

2.5 Regulatory response

In a competitive market, and where the demand is (relatively) discretionary, the market contains its own self-corrections for poor performance. Customers experiencing poor quality in a product or service will decrease consumption, either switching to a substitute or even just curtailing demand for the product altogether. A firm must respond to these market pressures – either correcting poor quality or adjusting price – or it faces failure in the market.

In a monopoly market, especially for a product or service that is "essential" and which demonstrates inelastic demand, the firm faces fewer risks if service degrades. Customers have few if any alternatives, and may have limited options for altering their consumption. They have little choice but to accept the lower quality product or service.[4] In this circumstance the regulator serves as a proxy for market forces, regulating the price that the firm can charge but also ensuring that the quality of the product or service is adequate to meet the needs and expectations of customers and that the price/quality combination is appropriate and "reasonable".

Monitoring, rewards and penalties

The first step in this is monitoring of performance – as a check that service is adequate and to identify situations where performance has degraded (or is degrading) such that a response is warranted. The second part is actually having a regulatory response to degraded performance. There must be consequences to below-standard performance such that the firm is motivated to rectify the situation (and, generally, to operate in a manner such that such occurrences are infrequent in the first case). In short, regulatory responses are designed to address a problematic situation, but the mere existence of the possible responses should act as a disincentive to degraded performance occurring in the first place. The "sticks" (hopefully) are rarely used, but they are there if needed.

Regulatory responses can also encompass "carrots", in terms of rewards when performance exceeds some threshold. Reward mechanisms are less common than are penalties, but there are some very different examples of this approach, in other jurisdictions and industries, discussed in the Appendix. There are also differences of opinion on the justification for reward mechanisms and their practical design. Similarly, the issue of symmetry between rewards and penalties is the subject of theoretical and practical debate.

There are many different approaches to regulatory responses, and, with some exceptions, combinations of these are possible. Further discussion on regulatory responses is provided in Section 5.1.3. The review of service quality regulatory regimes in other jurisdictions and other regulated industries, provided in the Appendix, provide examples of various types of regulatory responses.

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[4]All of this is stated in the short run. In the long run, customers have more opportunities to switch, substitute, or alter consumption.

Audits and investigations

Service quality monitoring largely relies on data collected by the firm (or which it has collected on its behalf) and then reported. There needs to be some assurance that what is being reported is being measured and reported accurately. And the need for independent assurance of the integrity of the data should be self-evident if there are financial consequences to service performance.

Even if performance is being measured and reported accurately, the regulator will also want some assurance of the firm's internal processes – that the firm does monitor the data, and that it can (and does) react to service issues when they appear.

Further, if a service issue does arise where the firm does not address the issue, and hence where the regulator must intervene, the regulator may want some process for reviewing the issue – what went wrong, what aspects of the firm's operations and management processes were contributory, and even proposing remedies. The regulator will also need evidence in support of actions it made need to take with respect to the firm – instituting special reporting requirements or conditions of licenses, or administering penalties – as appropriate.

All of these point to the requirement for audits and investigations of firms' processes for measuring and reporting service performance, so that the regulator – and the public – have confidence in the numbers.

It is also often the case the firm may have its own need for audits and investigations of its service measurement processes. The service measurement process, in its role to support operational management, may be assessed as part of an operational audit. Where service performance factors into employee or executive remuneration packages – i.e., as part of a "team award" based on financial and operational performance – there will a need for auditing of the processes as part of the accountability to shareholders. Firms will engage external auditors; in some cases, larger utilities may have internal auditors for such purposes. Service quality audits, for regulatory purposes, should avoid duplication where possible. However, they are still needed, to provide the same assurances of the integrity of the processes, but to a different audience – in this case, the regulator.

As a component of a service quality regulatory plan, service quality audits provide an ancillary and diagnostic tool for the regulator: 1) to have some assurance that service performance is being accurately measured and reported; 2) the firm has in place, and uses appropriately, processes for monitoring and managing service performance, particularly for responding to degrading service quality; and 3) the regulator may want to use audit and inspections to investigate specific incidents to identify what occurred and why, and possibly to direct or take action against the firm (e.g. issuance of a compliance directive or an administrative penalty). Audits and investigations thus serve as a necessary component for ensuring the integrity of service quality regulation.

2.6 Review of service quality regulation

Nothing stays static forever. Even regulation evolves and changes – as evidenced by the reform that has occurred in about the past two decades in various industries and jurisdictions. Network-based industries – rail, water, telecommunications, natural gas and electricity – have been around for less than 200 years. While their core infrastructure and business are fundamentally unchanged, they have undergone many technological and operational changes. And even if individual firms have long histories, the firms and the industry as a whole are vastly different from their beginnings – even while remaining in the same basic line of business.

Many customer service functions – billing, metering, installation and repair – are fundamentally unchanged over time, although there have been technological changes. Customers' uses of electricity have also modified their needs and expectations. Momentary outages are noticed and are a greater inconvenience now because of the greater use of integrated circuit electronics in household appliances and business and equipment, as evidenced by the need to reset the flashing clocks of business and household equipment and appliances.

The establishment of a set of reported service quality indicators, and an associated set of standards, creates a regime whereby the industry, the regulator, other stakeholders and even the general public can monitor performance both between entities and over time. Changes in technology and measurement can perturb such analysis. Yet it is important that allowances for changes be made – many changes are operationally beneficial to the firm and to customers. It must equally be recognized that changes are typically gradual (although the pace of change can be expected to accelerate in restructured markets).

The upshot of this is that the approved indicators should be reported for the foreseeable future, but that there should be a provision for periodically reviewing the indicators and associated standards. This is easily accomplished under a multi-year PBR regime (typically of 3 to 10 years in duration), as the SQIs and standards can be reviewed as part of the development of the next PBR plan. There can also be a provision in the service quality regulatory regime for a review to be initiated at any time, either upon an application by a utility or another party, or by the regulator upon its on motion. Within-term reviews would be expected to be supported by some evidence of a change – a technological change that makes an indicator obsolescent or radically changes customers' needs and expectations, or long-run trends in performance indicative of changed circumstances that need addressing. Material changes in the reported SQIs and associated standards should be subject to regulatory approval.

In summary, consistency in reporting is thus desirable for the perspective of monitoring performance, but it must be recognized that changes are inevitable. The issue is then of balancing between consistency and the need for change in light of technological and operational improvements.

3.0 Performance-Based Regulation in the Ontario Electricity Distribution Sector

This section of the discussion paper summarizes the development of the first-generation electricity distribution PBR plan in Ontario. The existing SQI reporting requirements, which serve as the starting point for the service quality regulation review, are one component of this PBR plan.

3.1 Development of First-generation PBR

Once Bill 35, the *Energy Competition Act*[5], was tabled, the Ontario Energy Board and the Ontario electricity industry started work in anticipation of its passage (which subsequently occurred on November 7, 1998, with the legislation, for the most part, coming into force on April 1, 1999). As there were around 300 municipal electricity distribution utilities then in place, early consideration was given to adopting a form of performance-based (rate) regulation. Not only did the new legislation allow for consideration of alternative forms of rate regulation, but it was viewed that PBR would be much more practical than traditional Cost-of-Service regulation for regulating so many firms.

Under guidance from the Board, Board staff engaged consultants to assist in research into and the development of a PBR regime that would apply to the restructured Ontario distribution sector. Information sessions were held to introduce the concepts of PBR. This led to the creation of four Task Forces to consider various issues on types of PBR and issues that needed consideration for the implementation of PBR and the readying of the market for competition in generation and marketing of electricity. The Task Forces continued their work until May 1999, with each Task Force issuing a Final Report with its recommendations to Board staff. Board staff, aided by their consultants, drafted the "draft Rate Handbook" with their recommended form of "first-term" PBR regulation for the Ontario electricity distribution sector. The Task Force reports were important, but not the only, inputs in the development of the draft Rate Handbook.[6]

There was no question that service quality regulation would be an integral component of PBR. The Board recognized that one of the objectives that it must consider in discharging its regulatory responsibilities, is: "[t]o protect customers with respect to the pricing of and quality and reliability of electricity service". It was also recognized that service quality is a consideration in setting or approving rates that are just and reasonable. Service quality regulation was also considered necessary to counterbalance the risk that the efficiency-seeking incentives of PBR could lead to service degradations due to cost-cutting.

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[5]The *Energy Competition Act* consisted of both the *Electricity Act, 1998* and the *Ontario Board Act, 1998* as well as amendments to related legislation.

[6]Much of the background work is available on the Board's website at www.oeb.gov.on.ca/html/en/industryrelations/ongoingprojects_pbr1stgen.htm .

However, there was no previous experience in formal service quality regulation in Ontario. Some utilities did have formal performance measures in place for operational purposes, and the Canadian Electricity Association and the Municipal Electric Association (now the Electric Distributors Association or "EDA") compiled "benchmarking" studies, but these did not have complete coverage nor were they public. Many utilities did not have formal measurements in place, often as their small size reduced their need for and ability to afford sophisticated measurement systems.

Despite this limited history, the Implementation Task Force dealt with service quality regulation as one issue under its consideration. The Task Force was composed of representatives of electricity distributors and other stakeholders, with participation by Board staff and consultants. To aid it in considering s rvice quality regulation, the Task Force conducted a survey of performance measurement in Ontario utilities. After revie g the survey results and considering appropriate policy, the Task Force recommended a set of service quality and reliability measures that was intended to be comprehensive and representative of service performance delivered to customers. While it was recognized that many utilities did not then measure at least some of these indicators, and hence would incur the costs and efforts of implementing such measures, it was felt that the recommended set of indicators would be appropriate for both operational and regulatory purposes.

In late June 1999, Board staff issued the draft Rate Handbook, which documented their recommended scheme for first generation electricity distribution PBR. Chapter 5 of the draft Rate Handbook dealt with service quality. The Board staff recommendations largely followed those of the Implementation Task Force.

3.2 RP-1999-0034

Following publication of the draft Rate Handbook by Board staff in late June 1999, the Board commenced a public proceeding to consider the proposals in the draft Rate Handbook. Following several information sessions conducted by Board staff across the province in July 1999, a Technical Conference was held in late August. This was followed by the proceeding in October 1999, where parties made oral and written presentations to a Board panel.

Following completion of the public record, the Board considered all material filed on the record. This consisted of work done by Board staff and consultants, reports of the Task Forces, the draft Rate Handbook, and the records of the Technical Conference and the proceeding. On January 18, 2000, the Board issued its Decision with Reasons RP-1999-0034.

In Section 5 of that Decision, the Board documented the proposal for service quality regulation as contained in the draft Rate Handbook, as well as the positions taken by and issued raised by parties in the technical conference and the proceeding. The Board then stated its findings. In summary, the Board adopted the service quality regulatory regime proposed in the draft Rate Handbook, with some changes. In addition to determining the form of service quality regulation of electricity distribution that should occur during first generation, the Board also noted some

issues that warranted further consideration. Board staff were directed to do further research on these issues (described in detail in s. 5.1 of this paper) in the development of a second-generation PBR plan.

The RP-1999-0034 Decision was followed up by the Electricity Distribution Rate Handbook (the "DRH"). The DRH was an update to the draft Rate Handbook to reflect the Board's findings in the RP-1999-0034 Decision and other related Decisions. The DRH was primarily intended as a detailed operational guide for electricity distribution rate-setting and economic regulation during first-generation PBR. Chapter 7 of the DRH documents the service quality regulatory requirements for the first term of PBR; a summary is provided in section 4.0 of this paper.

3.3 RP-2000-0069

In June 2000, the Minister of Energy, Science and Technology issued a directive to the Board regarding considerations related to rate setting. As a result of the Minister's directive, the Board commenced a generic Proceeding RP-2000-0069 in the summer of 2000, to re-consider certain matters of the RP-1999-0034 Decision and the DRH.

The Board issued its Decision with Reasons RP-2000-0069 on 29 September 2000. While the RP-2000-0069 Decision altered certain findings and details of the rate setting and adjustment mechanism for first generation PBR, no changes were made to service quality regulation. (Para.3.4.4)

3.4 RP-2002-0140

In early 2002, the Board initiated an internal review and a consultative process to consolidate and rationalize a reporting and record-keeping requirements that electricity market participants are subject to. In this regard, the process looked at all existing regulatory instruments and attempted to document them in one place. All reporting requirements were looked at in terms of their use and benefit versus the regulatory cost and burden of collecting such information. Through the internal review and external consultation, the Board developed a comprehensive set of regulatory filing requirements, organized by electricity market sector (generation, transmission, distribution, etc.).

The Board issued its Decision with Reasons RP-2002-0140 and the associated Reporting and Record-keeping Requirements ("RRR") in October 2002. Section 2.1.4 of the RRR institutionalizes service quality filing requirements as being an annual (calendar year) filing due by January 31 of the following year. Beyond this, the RRR does not detail the service quality filing requirements, but instead refers to section 7.2 of the DRH.

The RRR formalizes reporting requirements, including that of the SQIs. Compliance with the RRR is a condition of licence, with failure to comply subject to regulatory actions, up to and including administrative penalties issued by the Board, amending a licence to attach certain conditions to, or even revoking a licence. The RRR extends the service quality reporting

requirement to all licensed distributors.

While the RRR does not deal with the details of service quality reporting, it does institutionalize the requirement. Changes to the service quality regulation – particularly with regard to what is reported and the frequency of reporting – will require changes to the RRR.

3.5 Bill 210

On November 11, 2002, the Premier announced significant changes in the operation of the electricity market, which had opened on May 1, 2002. The changes announced in November included the capping of the commodity charge to 4.3¢/kWh for designated customers (primarily residential and the municipal, educational and medical institutional sector) and a freeze on other (distribution and transmission) rates. The commodity price cap was retroactive to the opening of the market. These announcements were legislated through Bill 210, the *Electricity Pricing, Conservation and Supply Act, 2002*, in early December 2002.

Before the announcements in November and the passage of Bill 210, the Board had initiated planning and research for the development of PBR II. On August 19, 2002, the Board announced a one year extension (to February 29, 2004) of first-generation PBR to allow LDCs to conduct necessary cost allocation studies and to allow more time for PBR II to be properly developed through consultation and due regulatory process. Bill 210 changed that. Current distribution rates remain in place until at least May 1, 2006, unless a utility receives prior approval from the Minister of Energy to make a rate application to the Board.

The distribution rate freeze legislated through Bill 210 significantly affects rate-setting activities, and related considerations of cost incurment and recovery, in utilities and at the Board for a few years. The rate freeze is, however, another form of PBR – a price cap with the X-factor equal to the inflation factor. Utilities are thus still motivated to search for and implement productivity improvements to meet the decline in real rates while maintaining profitability.

Bill 210 does not alter the Board's role in service quality regulation. In fact, the constraints imposed by Bill 210 may increase the need for regulatory oversight of service quality, to check that cost containment efforts by utilities in response to frozen rates do not result in degraded service.

Thus, while the Board's rate setting powers are constrained until at least 2006, and the implementation of the PBR II rate adjustment plan is deferred, there is a need to accelerate the review of service quality regulation and the implementation of a more comprehensive scheme. The Board recognized this and announced, on March 17, 2003, that it would commence a review of service quality regulation in 2003.

3.6 Bill 23

In May 2003, the Government introduced Bill 23, the *Ontario Energy Board Consumer Protection and Governance Act, 2003*. This followed a 100 day review of the Board initiated by the Government in October 2002. The Bill was passed and received Royal Assent on June 25, 2003 and was proclaimed on August 1, 2003.

Bill 23 alters the organization and governance of the Board. It also adds a new objective for the Board, with respect to the Board having a proactive role in informing the public on the operation of the restructured market. One approach for public communication, as recommended in the Badali report, would be publication of a report card on industry performance. As is discussed further in section 5.1.2, the service performance of electricity distributors is one type of information that could be contained in such a report card.

While Bill 23 makes changes in the Board's structure and operations, the Board's regulatory mandate is largely unchanged. In particular, the mandate to protect customers with respect to prices and the quality and reliability of natural gas and electricity is unchanged. It is in this context that the Board and staff consider that a review and evolution of service quality regulation is both appropriate and timely.

4.0 First-generation Service Quality Regulation

This section details the service quality regulatory requirements approved in Decision with Reasons RP-1999-0034 and documented in the DRH. The current SQIs are summarized in Table 4.1.

Table 4.1: SQIs Reported for First Generation Electricity Distribution PBR

No.	Indicator	Description	Standard
Service Quality Indicators			
1a.	New Connections – Low Voltage	The percentage of requests for new low voltage (< 750 Volts) connections where the connection is made within 5 days of all prerequisites (engineering, safety, etc.) being met.	90% or more
1b	New Connections – High Voltage	The percentage of requests for new high voltage (• •750 Volts) connections where the connection is made within 10 days of all prerequisites (engineering, safety, etc.) being met.	90% or more
2	Underground Cable Locates	The percentage of requests for cable locates that are completed within 5 days (of the initial date of the request or, if the customer so designates, a specific requested date).	90% or more
3	Telephone Service Factor (Telephone Accessibility)	The percentage of calls to the utility's general inquiry number that are answered within 30 seconds.	65% or better
4	Appointments Met	The percentage of appointments involving a customer premises visit (i.e. for repair, testing, etc.) where the appointment date is met.	90% or more
5	Written Responses to Inquiries	The percentage of customer inquiries requiring a written response where the response is provided within 10 days of receipt of the initial inquiry.	80% or more
6a	Emergency Response – Urban	The percentage of emergency situations in urban areas where the presence of utility personnel is requested by police, fire, etc., and where qualified personnel are on site within 60 minutes. The definition of urban corresponds with that of the "urban" area for municipal governmental purposes.	80% or more
6b	Emergency Response – Rural	The percentage of emergency situations in rural areas where the presence of utility personnel is requested by police, fire, etc., and where qualified personnel are on site within 120 minutes. The definition of rural corresponds with that of the "rural" area for municipal governmental purposes. In practice, this sub-indicator does not apply to many LDCs, which serve primarily the built-up areas (towns, villages, cities) in municipalities.	80% or more

No.	Indicator	Description	Standard
Reliability Indicators			
7	System Average Interruption Duration Index "SAIDI"	Defined as the ratio of the total customer hours of interruption to the total number of customers served. In lay terms, it provides the average amount of time (in hours) that a customer experiences service interruptions over the reporting period.	Within the range of 3 years of historical performance, for LDCs with such information.[7]
8	System Average Interruption Frequency Index "SAIFI"	Defined as the ratio of the number of customer interruptions (the sum of the total number of interruptions by the number of customers affected by each interruption) to the total number of customers served. In lay terms, it provides an estimate of the number of interruptions, on average, that a customer experiences over the reporting period.	Within the range of 3 years of historical performance, for LDCs with such information.[7]
9	Customer Average Interruption Duration Index "CAIDI"	Defined as the ratio of SAIDI to SAIFI. In lay terms, it defines the average length of a service interruption experienced by a customer over the reporting period. Put another way, it measures the utility's average response time to restore service in instances of interruption.	Within the range of 3 years of historical performance, for LDCs with such information.[7]

The definitions provided above summarize the descriptions provided in Chapter 7 of the DRH. While some more detail is given in the DRH, there is still a lot of room for interpretation, as has often been discussed between utility and Board staff. However, these definitions are largely derived from the work of the Implementation Task Force, which included utility representatives.

In addition to the reported SQIs, utilities are required to maintain records on the number of outages by category of the cause and nature of the outage; such information is reported upon request by the Board. (Reference: Section 7.3.2.4 and Table 7.2 of the DRH).

4.1 Temporal Issues

In the RP-1999-0034 Decision, the Board directed utilities to report monthly results. In para. 5.0.26, the Board stated its reasons:

> The Board has some concern that an annual average result may not provide it with adequate information on service degradation. Annual results can conceal seasonal variations in performance. ... The Board therefore will require utilities to record service performance on a monthly basis and for the first year to report the

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[7] This has proved problematic. Even where a utility had previously been measuring these reliability indicators for its own operational management purposes, it was not subject to Board regulation. Utilities did not file their historical performance data, and hence the Board does not have the information for assessing if LDCs are performing "within-standard" for the reliability indicators. This changes for 2003, as LDCs have now been reporting the SQIs for 3 years.

results to the Board at the time of the utilities' filings for year two of the PBR plan.

The LDCs have continued reporting monthly results with their annual filings. Such filings are due at the end of January of each year, and are filed along with certain financial and operational statistics. At present the Board has three years (2000-2002) of filed SQI data.

4.2 Reporting Entities

Service quality results are reported at a corporate level by each LDC. There is no consideration of the size or operating environment of an LDC.

However, in reality, a utility may not report one or more SQIs on the basis that these are not applicable. Emergency Response – Rural has the lowest report rate – less than 33% – as most LDCs, serving the cities, towns and "urban" areas of their respective municipalities, do not serve rural areas. New Connections – High Voltage is another SQI with a low report rate, as many utilities, particularly the numerous smaller ones, would only infrequently have requests for new high voltage connections.

There have been cases where LDCs have not been reporting a certain SQI until they implement necessary systems. The incidence of this has declined, and there are only a few situations for 2002. While such delays are undesirable, the Board and staff can appreciate that utilities have faced challenges in restructuring, mergers and acquisitions, corporatization and getting market-ready that have sometimes hampered implementation of necessary systems. LDCs are now largely compliant now and are expected to continue to be so.

4.3 Follow-ups and Remedial Action

The Board considered that the major concern was to get all LDCs to start measuring and reporting service performance. The appropriateness of the indicators and the standards for all LDCs was unknown, and at the time of the RP-1999-0034 proceeding, the eventual number of LDCs was unknown. The Board considered that it and the industry needed to gain experience with the indicators before processes for remedial action or for financial consequences of service performance were enacted.

Beginning in mid-2003, the Board has commenced service quality audits. These audits are to check that the selected LDCs have appropriate measurement plans in place, and are measuring and reporting performance accurately. Further information on the operational use of the data by utility management, and on the definitions, inclusions and exclusions, will be collected. In line with the intent of first-generation PBR, these audits are investigatory in nature – to provide the Board with a better understanding of LDC's performance measurement systems and associated operational processes. This information can provide important information on issues that need to be addressed. It will also allow the Board to identify where measurement systems and processes should be changed – either to correct inaccuracies in measurement or to aid in service delivery

and measurement. These investigations and audits could provide information to support regulatory actions taken by the Board where necessary. The audit and investigation process will evolve over time to support the established SQR plan, including providing support for compliance enforcement, in accordance with Part VII.1 of the OEB Act (as amended August 1, 2003).

5.0 Issues for Consideration for Second Generation Electricity Distribution PBR

In this section, we lay out the main issues for consideration regarding SQI regulation in 2nd generation PBR. We take as our starting point the first generation PBR SQI regime. The issues under consideration are the following:

i) issues specifically identified by the Board in the RP-1999-0034 and RP-2000-0069 Decisions for further research and for consideration during the mid-term review;
ii) issues arising from the experiences of first-generation PBR; and
iii) issues identified as being typical of SQI regimes based upon a review (documented in the Appendix) of service quality regulation as practiced in other jurisdictions and industries.

Items in i) are discussed first. These issues are viewed as essential, as the Board directed staff to conduct research into these areas. The requirement for research into and consideration of issues in this category does not, however, prejudge the recommendation(s) on any issue.

Issues falling in categories ii) and iii) are discussed together in section 5.2. Board staff consider that these issues merit consideration in the review, but again without prejudging recommendations on any of these issues.

The discussion in this section also does not preclude identification and consideration of other issues.

5.1 Issues Raised in Decision RP-1999-0034

The issues raised below are those specifically identified by the Board in its Decision with Reasons RP-1999-0034 as warranting further research and consideration.

5.1.1 Additional Indicators – MAIFI

MAIFI, or Momentary Average Interruption Frequency Index, was suggested as a potential indicator during the development of first-generation PBR. This is a measure of the frequency of momentary outages. Momentary outages (less than a minute in duration, but frequently lasting only several seconds or fractions thereof) increasingly represent "poor" (and frequently irritating) service to customers because micro-processor-based electronic technologies used prevalently in both home and businesses are sensitive to such momentary interruptions. Momentary outages are a frequent cause of the need to reset clocks on electronic devices.

Accurate measurement of MAIFI is reliant on SCADA (Supervisory Control and Data Acquisition) technology, and the definition of a momentary interruption is not applied consistently in the industry.

The Board did not adopt MAIFI as an indicator for first-generation PBR, but stated:

> The Board sees merit in the suggestion that a measure of system reliability for shorter duration or momentary outages (MAIFI) be monitored and reported. However, the Board was not provided with sufficient information on the current use of MAIFI within the Ontario distribution electricity industry. The Board expects this measure will be further investigated and considered in the review for second generation PBR. (Decision with Reasons RP-1999-0034, para. 5.0.23)

Now that there has been rationalization and consolidation in the industry, and more LDCs have implemented automated SCADA systems, MAIFI is to be further investigated for consideration as an SQI which could be reported.

5.1.2 Public Reporting

In para. 5.0.25 of the RP-1999-0034 Decision with Reasons, the Board stated:

> The Board agrees with suggestions that service quality performance results of the distribution utilities should be reported to inform customers and the general public. The specifics regarding dissemination of such information will be addressed in due course.

The delays in opening the market, and the workload on the industry and on the Board, have delayed consideration of public reporting of the data.

Public reporting of service quality should not be a contentious issue. The data reported are historical actual performance. The measures reported relate to the performance of firms that are regulated and, for the most part, operate as monopolies. Public disclosure of these performance results would not cause specific direct harm to the LDCs or to other entities, because of the aggregate, historical and operational nature of the data.

Board staff are unaware of regulatory regimes, in electricity or in other network-based industries, where service performance is reported in confidence. As is discussed in Section 6 of this paper, some regulatory agencies are ensuring that service performance is publicly available through their web sites. Public availability is seen as being in the public interest, as it helps customers to assess the prices and performance of their utility compared to that of similar firms. Public disclosure allowing such comparisons should motivate under-performing utilities to improve their performance. Finally, in his report on the independent review of electricity bills, rates and other matters commissioned by the Government of Ontario, Mr. Sal Badali of Deloitte Consulting recommended publication of a report card on the Ontario industry. While he did not specify the information that should be communicated, service performance would, logically, be a component of such a report card.[8]

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[8]As it is in similar reports issued by regulators in other jurisdictions. See, for example, the annual reports issued by the Tasmanian and New South Wales regulators.

The issue here is not if the data should be publicly reported, but how.

The issue of public reporting and availability of results is tied also to the Board's Electronic Regulatory Filing ("ERF") initiative. As part of this initiative, PBR and SQI data, and other regulatory applications and reports, are filed on-line.

Parties should consider options for how reported performance data should be made publicly available, including consideration of supplemental analysis to assist in the understanding of the data. With regard to the latter, while supplemental analysis can aid in comprehension, it does require additional time. Analysis may also, intentionally or otherwise, introduce biases in the reported performance of some utilities, particularly those with poorer results.

5.1.3 Responses to Below-standard Performance

Measuring performance is not enough. Performance must also be managed.. From the firm's perspective, it should be collecting and assessing the adequacy of its own performance as part of operational management. The data should be used to identify if and when problems occur, and may aid in identifying what correction action may be needed. Finally, performance data will indicate whether such actions are successful in resuming adequate performance.

There is a regulatory counterpart to this. The regulator not only needs to be able to monitor performance, but it should have information of when problems occur and on the appropriateness and adequacy of the firm's actions in maintaining adequate service, and of responding to service problems that may arise. The regulator also needs to be able to intervene when necessary.

In the RP-1999-0034 Decision, the Board stated the following:

> The Board has also considered the suggestions by parties that the PBR plan include remedial action and financial consequences in the case of service quality degradation. In the Board's view an appropriate assessment of these matters cannot be made until the Board and the industry have gained experience with the application of the PBR plan for the first year and appropriate service quality performance data becomes available. (para. 5.0.27)

In essence, the Board recognized the importance that there should be some "teeth" to service quality regulation. However, the first priority was getting all electricity distributors to start measuring and reporting performance data. Without greater experience on the performance levels of the industry and the appropriateness of the initial standards, there was a risk of "getting it wrong". Thus the Board, while recognizing the need to look at regulatory mechanisms for addressing below-standard performance, decided that the details of regulatory response mechanisms should be deferred while experience was built up.

A general description of possible responses is provided in Bell Canada's submission to the Canadian Radio-television and Telecommunications Commission ("CRTC") on "Mechanisms

for the Maintenance of Quality of Service in a Price Cap Regime", pp. 4-5:

> "There are several means by which a regulator can provide disincentives against the regulated firm(s) degrading service (below acceptable levels) and/or provide incentives for the firm to improve service beyond the current levels. Regulators typically use one or more of the following:
>
> - quality of service monitoring requirements;
> - individual customer rebates (to ensure that customers do not pay for services not received or of such poor performance as to be valueless to the customer, and possibly to compensate the customer for the aggravation of the sub-standard occurrence); and
> - general financial penalties."

"Quality of service monitoring requirements" typically involve, at a minimum, additional reporting to explain the cause of, and the corrective action taken by the firm to remedy, below-standard performance. Such remedial action reporting is typically not onerous, as the management of the firm should need such reports to decide on operational responses to service problems. Filing of such reports with the regulator allows the regulator to monitor the situation, and, when necessary, to intervene if the firm's actions are insufficient to remedy the situation within a reasonable time span.

The necessity of having to report problem situations to the regulator, both in terms of regular oversight and remedial action reporting, and the risk that the now-informed regulator may reduce the firm's rates or revenue requirement (in a subsequent proceeding or PBR review) in light of numerous service degradations, should act as a disincentive against service degradation. However, many jurisdictions have also investigated and adopted more direct approaches, where service performance, particularly below-standard performance, has direct financial consequences.

Individual customer rebates, often labeled as a "customer service guarantee", are increasingly common. They may be adopted voluntarily by the firm, or may be the result of a regulatory initiative involving both the regulator and the industry. Issuing rebates as compensation to those customers who have actually experienced the degraded service may be the most appropriate and direct approach. However, not all aspects of service lend themselves to an individual rebate mechanism. For example, telephone accessibility is not well suited to service rebates, as it is not possible to identify those customers who can't get through and thus suffer the worst level of service.

An alternative approach is to establish a general penalty (or reward) mechanism. Under this approach, the firm's revenues or profits are decreased as a result of below-standard performance, or, in the case of above-standard performance, increased. The decrease in profits is accomplished by tracking the penalty amount in an account, and issuing general rebates to customers, prorated for each customer's billed amount or consumption during the period. A

reward scheme would result in an incremental revenue requirement reflected in approved rates. The rate or revenue requirement adjustment may be temporary (applicable until the next, often annual, adjustment).

A different form of penalty-reward mechanism is a Q-factor, which is directly tied to the price cap (or revenue cap) formula:

$$P = I - X \pm Z \pm Q$$

where Q is an index of service quality, transformed to be an incremental adjustment to the price cap. One common criticism of the Q-factor approach is that the general formula, as given above, results in a permanent change to rates even if the service degradation is temporary. This has been remedied formulaically in Rhode Island's PBR plan for its local telephone company, Verizon (previously Bell Atlantic).[9]

Linking financial consequences to service performance is often contentious. The financial consequences should be severe enough that they motivate the firm to maintain service at adequate levels (or to quickly remedy problems), as opposed to paying a penalty that is less costly than providing the expected level of service. However, penalties should not put the firm in (risk of) financial distress. There is an argument that the "risk" of penalties should be factored into the base revenue requirement of the firm.

The need for symmetry of financial consequences is also debated. The emphasis in most schemes is to act as a disincentive against service degradation. There are arguments that reward mechanisms are unnecessary and inefficient. First, reward mechanisms may result in "gold-plating" of service (an accusation also frequently leveled at cost-of-service regulation). Second, a firm, even a monopoly, will often benefit from providing service above the minimum standard as customers will appreciate the good service and tend to purchase more from the firm. The firm may also find that its costs may be lower at some level (or range) of performance above the standard as improved quality requires less rework and customer handling. The firm is free to choose an operating level of service, above the minimum regulatory-set standard, that maximizes its profits and profitability, and does not require an additional "reward" incentive.

However, reward mechanisms are used in some jurisdictions. OfGem's Information and Incentives Programme (discussed below) has rewards as well as penalties. It has also been reported that the Italian regulator, Autorità per l'energia elettrica e il gas, has granted ENEL Distribuzione a revenue increase of EUR 32 million for reducing average duration of interruptions per customer, including beating the regulator-approved standard.[10] Other examples of reward mechanisms are discussed in section A.2 of the Appendix.

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[9]See s. A.2.4

[10]NERA, Global Energy Regulation, February 2003, p. 7

In conjunction with the review of the indicators and associated standards, options for appropriate remedial action reporting, and for direct financial consequences of below- or above-standard performance are to be investigated.

5.2 Other Service Quality Regulation Issues

In addition to issues where the Board directed staff to conduct further research related to service quality regulation, as discussed in the previous section, other aspects of Service Quality Regulation should be examined. Several of these arise directly from the experiences of first-generation PBR. Other issues are identified based on a review of service quality regulatory regimes in place in other jurisdictions and industries. A survey of these regimes is provided in the Appendix to this paper.

5.2.1 Temporality of Reported Performance

The Board requires that monthly results be reported for all indicators, even though performance is only reported annually. As noted in the RP-1999-0034 Decision, there is a concern that annual results can hide seasonal variations.

As a component of its Board-approved PBR plan, Enbridge reports quarterly results on an annual basis. In other jurisdictions, regulators may require reporting of monthly, quarterly, semi-annual or annual data. In general, the periodicity should be no finer than that required by firms in the industry for managing operations, although in many cases this will be monthly.

It is also possible that certain indicators better lend themselves to different periodicities (although this must be balanced against the complexity and confusion of having different reporting requirements for different indicators). Standard setting and rules for responding to below-standard performance must also consider the periodicity of the reported data.

The periodicity of SQIs should be considered in light of the above.

5.2.2 Frequency of Reporting

Results are reported annually, and are due at the end of January of the following year. While monthly results are reported, this still means that a below-standard result in January is not reported to the regulator for over 12 months. (Conversely, a below-standard result in December is reported with a lag of one month.) Lags in reporting can diminish the ability of the regulator to intervene when necessary, and increase the risk of a service degradation becoming persistent.

The Board has adopted annual reporting for both natural gas and electricity distributors. In other jurisdictions, reporting may be annual, semi-annual, quarterly or even monthly. More timely information can assist in identifying and responding to below-standard results, but this must be balanced with the cost and burden of more frequent reporting.

The appropriate frequency of reporting should be considered. Should annual reporting be retained, or would another reporting frequency be more appropriate?

The issue of frequency of reporting may be addressed in other ways. Could annual reporting of results be the norm, with below-standard results reported with a shorter lag (one month or one quarter after), be an option to balance the regulatory burden versus timely identification of below-standard performance?

5.2.3 Reporting Level

Another issue is the operational level that performance should be reported at. The smallest unit of reporting would conceivably be the business units (work centres, districts, etc.) that utility operations are managed at; the largest aggregation is the firm itself. The aim is to strike a balance between the level of reporting (and the associated volume of data and hence the "regulatory burden" of reporting) and the fact that aggregating of data at a high level can hide service differentiation and localized performance problems through "averaging".

For the first-generation PBR, the Board adopted an approach of having LDCs report performance at a corporate level. This approach is common in SQR plans, and has merit here given the composition of the Ontario electricity distribution sector. There are nearly 100 LDCs in the province (and there were over twice that number in January 2000, when the Board released the RP-1999-0034 Decision), serving about 3 million customers. These LDCs range in size, individually serving a few hundred customers to over 1.3 million customers. Most LDCs serve a single well-defined service area, typically defined by the boundaries of a town or city. Even where an LDC serves more than one community, with some geographic separation, the non-contiguous service areas are close enough that most operations are provided from one service centre. Other operations, such as billing and call centre, are often provided on a common basis to all customers of the LDC.

However, there are some larger utilities serving several hundred thousand customers. Hydro One Networks serves approximately 1.3 million customers throughout a large and scattered area of the province. Hydro One Networks and Toronto Hydro are "large" distributors, even when compared to other Canadian and American distributors. These, and some other LDCs, have several operations centres for providing services on a localized basis, and this could result in different customers receiving differential levels of service depending on their area.

While reporting at a corporate level may be appropriate for most LDCs (where operations are managed at that level), consideration should be given to whether reporting at lower than the corporate level is practical and advisable for certain (larger) LDCs.

5.2.4 Cohort Groups and Normalization

In the first-generation PBR, the SQIs and associated standards were set for the industry as a whole. All LDCs are to monitor and report on the indicators, and, for each indicator, the same minimum standard applies to all LDCs.

This approach has some positive attributes. Commonality of indicators and standards should promote equitability of service throughout the province. But this approach has its deficiencies. The standards were established, in part, based on Task Force input and a survey of utilities, to be the minimum acceptable for any utility, regardless of size or operating parameters. It was recognized that many utilities were capable of operating a much higher levels of performance, in consideration of cost minimization and customer expectations. However, there was a risk that setting the standards higher could be onerous on some utilities. Thus the Board accepted the recommended (minimum) standards, but also indicated that utilities already operating above the standards should continue to do so, with regard to cost considerations and to customer expectations.[11]

An alternative would be to segment LDCs according to certain characteristics, and to establish different standards for different cohorts, taking into consideration the operating characteristics and conditions that the LDCs in each cohort face.[12]

In fact, the establishment of separate sub-indicators for urban and rural emergency responses (with the same standard but different operational thresholds – 60 minutes for urban and 120 minutes for rural areas) does, to some degree, segment LDCs. Many LDCs are categorized as urban because of their size and licensed service area. Some LDCs may be only rural, and some must report performance on both sub-indicators.

Consideration should be given as to whether cohort groups, with different service quality standards to reflect the operating characteristics of the LDCs in the cohort, would be appropriate. If cohorts do seem reasonable, which indicators should have differentiated standards and which should have a common industry standard? How should the differential standards be set so as to balance promoting service improvement and equitability of service versus the operating factors affecting LDCs in different cohorts?

An alternative approach is being considered in the U.K. Under the auspices of an Information

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[11]Decision with Reasons RP-1999-0034, para. 5.0.20

[12]To the extent possible, the SQIs should be common to the industry, to allow the industry, the regulator and the public to compare the performance across the LDCs or to compute industry statistics.

and Incentive Program[13], the energy regulator OfGem has adopted an approach where the service performance of the distribution network operators (DNOs) – the distributors – are comparable against each other after adjusting (i.e. normalizing) for certain characteristics that vary between DNOs, that can be expected to influence service performance, and that largely are beyond the control of the DNO's management to control. Environmental characteristics, including customer density, are being considered. (The age (actually age distribution) of the DNO's network is another factor – even though upgrading and replacement of the network is controllable by the utility, it is not something that can be done overnight; network enhancement is a long term initiative. As a result, a utility's performance may be dragged down until it is able to enhance a certain proportion of its network.) The OfGem approach also uses financial rewards and penalties linked to service performance.

As an alternative to cohorts, discussion on the use of normalization to facilitate benchmarking of LDCs performance could be considered. Such discussion should consider the dimensions or factors on which normalization should be based (such as customer density) and how normalization could be done.

5.2.5 Data Definitions and Measurement Techniques

Chapter 7 of the DRH provides the current definitions of the reported SQIs. These definitions in very large part are taken directly from the work of the Implementation Task Force, and represent the definitions or descriptions worked out by industry and other stakeholder representatives. Some parties during the RP-1999-0034 proceeding requested greater specificity in these definitions, and the Board, in the RP-1999-0034 Decision, commented that this would be addressed to the extent practical in the DRH. This was done, but to a limited extent.

Review of the service performance data filed for 2000, 2001 and now 2002 suggests that there may not be consistency in measurement. This is not surprising, given the number of utilities involved (close to 100). The newness of performance measurement for some entities has probably also been contributory. Even for firms that had measurement systems in place and some experience with performance measurement, differences may have developed because of operational considerations, both historical and current.[14]

There have been discussions between utility and Board staff regarding greater specificity of definitions and measurement. However, this is only practical to a limited extent, without having widespread consideration of the varied circumstances and operational practices of the many

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[13]See OfGem, "Information and incentives programme: Comparing quality of supply performance", October 2002, http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/1388_oct2002.pdf

[14]An audit conducted on behalf of the service performance measurement systems of UK distributors reported similar issues of inconsistency of measurement between entities.

utilities, including consideration of what constitutes "best utility practice". Consideration must be given to the premise that these measures are first and foremost intended to help the utility manage its operations efficiently and effectively.

Increased consistency is desirable for regulatory purposes. Consistent measurement will facilitate comparisons between different utilities (by the industry, the Board and the public). Consistent measurement will also mean that comparison against the standard can be assessed and interpreted similarly for all LDCs. Consistent measurement will also facilitate adoption of remedial action and reward/penalties schemes industry-wide. If service quality is a dimension that will factor into second-generation (or later) PBR rate-making, consistency of the SQIs will be needed. In short, greater consistency in measurement, where practical, is highly desirable.

It is probably necessary to review how LDCs define and measure the various service quality indicators. All pertinent parameters (what is the minimum duration time for an outage to be included in SAIDI and SAIFI, what exclusions are there for various SQIs) should be identified. It is probably necessary to be more prescriptive in the definition and measurement of SQIs for second generation. Some LDCs may have to make adaptations to existing measurements. Any move towards more consistent measurement must take into account three considerations:

- the environmental circumstances, structure and operations of any utility;
- what operational approaches constitute "best utility practices" and how performance should be measured in support of such practices; and
- the costs and benefits of achieving greater consistency (either voluntarily or otherwise).

While universal consistency is probably unrealistic, greater consistency in measurement is one desirable goal. This should include greater specificity in the definition and measurement method of existing SQIs. Any new SQIs introduced should have more complete definitions and descriptions of their measurement.

5.2.6 System versus Distributor Performance

The definition and measurement of the reliability indicators should receive attention. An issue raised by some utilities with Board staff is whether SAIDI, SAIFI and CAIDI should measure only those interruptions occurring in the distribution system (or even just those controllable by the distributor) or whether all incidents, including upstream "loss of supply", should be reported. The Board's RP-1999-0034 makes it clear that all incidents should be reported:

> The Board considers that service interruptions as experienced by customers, regardless of cause, should be reported to the Board. The Board notes that the cause of interruption is to be documented as well. In any instances of service interruptions, the Board will take into account exogenous factors that impact on the reported performance. (para. 5.0.21)

However, examination of SAIDI, SAIFI, and CAIDI results suggest that different utilities have

been using different approaches in measuring and reporting performance.

The concern of utilities with respect to including all interruptions is that interruptions in supply upstream of the distribution network (i.e. in generation or transmission) are not controllable by the distributor. Some report that these "supply" interruptions constitute the majority of all interruptions. Particularly if a standard is applied and there is a possibility of financial or other regulatory consequences, distributors' performance should be assessed on those operations which they directly control.

On the other hand, including all interruptions provides an indication of the inconvenience experienced by customers. A customer can not generally distinguish whether the interruption is in the distribution system, the transmission system or with the generator, and really doesn't care – he or she just wants power restored as quickly as possible. Having SAIDI, SAIFI and CAIDI reported on all service interruptions provides the Board, the industry and the public with an indication of the performance of the system in totality.[15]

SCADA systems will capture all interruptions regardless of the source; thus the data is available to the distributor. Per section 7.3.2.4 of the DRH, LDCs are required to maintain records on all interruptions, including the identified cause of the interruption. Inclusion of categories such as "Loss of Supply" (i.e. upstream interruption in generation or transmission), "Lightning", "Adverse Weather" and "Foreign Interference" identify that all interruptions should be recorded.

Some utilities have indicated to Board staff that they have and use measures of both system and distribution network performance in the management of their systems; this is also likely the case for other LDCs. The possibility is then for LDCs to report two sets of SAIDI, SAIFI and CAIDI results – one reflecting all service interruptions and the second reflecting only those in the distribution system.

A related issue deals with *force majeure* incidents, such as ice storms or hurricanes. Such incidents are largely uncontrollable by the distributor even where it is the damage to the distribution network that is the source of interruption. Significant ice and rain storms or hurricanes can cause significant damage and can interrupt service to a large number of customers. Such acts of nature may significantly affect reported reliability. (On the other hand, decisions of the utility's management – regarding investments, reinforcement and replacement, and on staff and resource management – can impact on the incidence of and time to recover from such events.)

As an example, draft IEEE documentation of reliability indicator measurement contained a

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[15]The transmission system operator should be monitoring the performance of the transmission network with respect to service interruptions as well. However, one difficulty is that the transmitter will generally not have information on how many customers have been affected in downstream distribution systems.

proposed method of adjusting reported performance to exclude aberrant results (such as ice storms and hurricanes) using a 10% rule – an incident is excluded if at least 10% of customers were affected. While the 10% rule appears to be used internally by at least one Ontario distributor, this approach may not be practical for the Ontario industry given the variability in the sizes of utilities. For some smaller utilities, 10% of the customer base may be 20 to 30 customers; in most cases a service interruption of such a low number of customers which would hardly qualify as an "extraordinary" event.

These issues occur in other jurisdictions as well. In certain Australian states, distributors report up to five variations of SAIDI, SAIFI and CAIDI:

- all service interruptions > 1 minute in duration;
- service interruptions > 1 minute in duration occurring in the distribution network;
- unplanned service interruptions > 1 minute in duration;
- planned service interruptions in the distribution network; and
- unplanned service interruptions excluding significant (i.e. *force majeure*) events.

The possibility of reporting of SAIDI, SAIFI and CAIDI for both all service interruptions and for service interruptions in the distribution network should be considered. Also, the possibility of excluding or adjusting for *force majeure* incidents, and how these should be defined, should be examined.

5.2.7 Standards

The standards adopted for first-generation PBR were those recommended in the Board staff draft Rate Handbook. In turn, these were based on the work of the Implementation Task Force and took into account a survey of the MEUs regarding their performance measures in place, and historical performance, at that time. The adopted standards are what was considered to be the minimum level of performance that would be "acceptable" regardless of a utility's capabilities and circumstances. The selection of standards was largely subjective, as many utilities did not have historical data. Nonetheless, there is some reasonableness to the adopted standards – many 90% – on the basis of what is achievable while ensuring that the majority of customers should receive (and be satisfied with receiving) adequate service. For the most part, the adopted standards would also seem to be in line with those of other jurisdictions and industries.

Standards were not formally established for the three reliability indicators of SAIDI, SAIFI and CAIDI, although utilities that had been measuring these indicators were expected to operate within the limits of their performance for the past three years. This has proved problematic, as the Board's regulatory oversight of the Ontario electricity industry is recent. LDCs were not reporting their historical performance, and so the Board has little information to assess whether those LDCs were performing within the range of historical performance. However, with the 2002 SQI filings, most utilities have filed results for three years, and so reliability performance for 2003 can be judged against reported performance for 2000-2002.

Now that the industry and the Board have some experience with utilities' performance with certain SQIs, the question is what standards should be established for these indicators. The determination of appropriate standards may consider the periodicity of the reported data: if performance results are reported as annual figures, thus smoothing month-to-month variability, it may be appropriate to establish a more stringent standard than if performance is reported with a finer gradation (e.g. monthly or quarterly).

Probably, and more importantly, the use of performance data for identifying inadequate (or superlative) service for remedial reporting and for penalty/reward mechanisms (see s. 5.1.3 "*Responses to Below-standard Performance*") must be taken into account in setting standards.

It is also worthwhile to consider whether there should be standards for certain indicators. In the Canadian telecommunications industry, it has long been accepted that customer complaints should not have a standard. Complaints are viewed as providing ancillary and qualitative information of service (and other) issues, and the frequency of complaints can be significantly impacted by events beyond the control of the firm. Complaints are tracked, and their incidence over time is viewed, but there is no explicit standard. Consideration should be given as to whether there are any indicators for which performance should be monitored but for which a formal or preset standard is inappropriate.

As discussed in s. 5.2.4, *Cohort Groups and Normalization*, consideration may also be given to having differential standards for different classes of utilities, although this must be balanced against a principle of "equitability" of service performance for Ontario consumers.

5.2.8 Additional Indicators

This section looks at possible SQIs beyond those adopted for first generation PBR and MAIFI, into which the Board directed further investigation. The general types of SQIs discussed here are those that have been identified from research on service quality regulation in other jurisdictions and industries. This discussion does not recommend any position on the SQIs, but discusses their properties and uses, and identifies any factors that should be considered in discussing these possible measures.

The discussion in this section is not intended to be exhaustive. The general types of measures discussed in the following subsections are those identified from the research in other industries and jurisdictions, and that Board staff view as being worthy of further research and consideration. There may be others indicators, and it is expected that consultation with industry and other stakeholders will result in identification of the most suitable set of measures representative of industry performance and useful for service quality regulation.

5.2.8.1 Customer Satisfaction

All of the first-generation SQIs are quantitative operational measures. These report on the performance delivered by the firm to its customers, but do not measure customers' satisfaction with the delivered performance. Customer satisfaction can be directly measured through customer surveys.

Surveying of customers to identify expectations and satisfaction should be done as part of the development of a service quality regulatory plan. Customer satisfaction measures with service may be specific measures regularly reported; this is the case in a number of jurisdictions and industries.

Measuring and reporting customer satisfaction is not without its disadvantages. Customer satisfaction measures are more costly to collect than are most operational measures. This is because surveys must be designed and conducted, while many technical measures can be derived from operational systems. Also, a measure of customer satisfaction does not necessarily correspond directly with the service level being provided. Customer satisfaction may be influenced by various external factors, such as media attention on the utility or industry, or announcements of applied for or approved rate changes. For some operational processes, customers may not have an understanding of the process, and hence may not be able to provide meaningful input. Customer expectations (and hence satisfaction levels) also may change over time, due to technological requirements or experiences with similar products and services, such as billing, that customers get from other firms.[16] This may result in satisfaction varying over time even when performance is constant.

Customer surveying can be done either regularly, or on a "one-shot" basis. The Implementation Task Force recommended that the Board conduct a customer survey to assess what aspects of service were important to customers, and also what customers' expectations on adequate service levels should be. The Board has noted this in the DRH:

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[16]Gas distributors, telephone and cable companies, water utilities, banks, even supermarkets and, more recently, Internet Service Providers are used for such service quality benchmarking studies. Customers' relationships with and expectations of services with these are have several similarities. There is typically a "physical network connection", a long-term stable relationship, and periodic or frequent billing. The relationship between the utility and the customer is often "impersonal"; this is often acceptable as long as the service works, but the customer will expect "personal" communication when needed. Customers have sufficient interactions with these businesses, and are aware of these firms. Utilities such as Bell Canada and Gaz Metropolitan have used such benchmarking studies in the past, and similar work is conducted in other jurisdictions (i.e. NRRI in the United States.) Even if the distributor is a local monopoly, its customers can, and often will, assess its performance against their experiences with these other firms that they deal with.

> In addition to imposing service quality performance standards, the Board may conduct surveys to determine customer satisfaction with the electricity distribution service quality. (Section 7.1, page 7-2)

It is not common for the regulator to conduct such surveys. In most cases, the firms are expected to conduct surveys, and to report customer satisfaction levels. This makes sense for several reasons:

- the firm has information on customers (contact names, addresses, telephone numbers) from which a statistically valid sample can be drawn;
- the firms are more able to fund survey activities; and
- where follow-ups may be necessary to address issues raised by surveyed customers, the utility, and not the regulator, should be involved. Thus the survey data must be available to the firm.

The structure of the Ontario electricity distribution sector must be considered for any surveying. There are a large number of distributors (around 100), and they vary significantly in terms of size. The largest has approximately 1.3 million customers, while the smallest currently serves about 180 residential and commercial customers. The small size of many utilities creates difficulties for surveying by utility on a regular basis, due to sampling concerns and costs. Sampling becomes a concern because customers of a smaller utility will be re-sampled more frequently, with frequent surveying often becoming a source of irritation. Smaller utilities may find it difficult to fund customer survey development and regular surveying.

An alternative approach would be to conduct a survey on an industry-wide basis.

Customer satisfaction, measured through surveys, should be considered as to its advisability either for a one-time study (repeated periodically, to reassess customers' experiences and expectations) or as a regular measure of customer satisfaction with service quality and reliability. If customer surveying is considered, who should do such measurement and how should it be done?

5.2.8.2 Customer Complaints

The flip side to customer satisfaction is customer complaints. Actually, customer complaints are probably the easiest and most direct way of getting customer input on a firm's performance. Handling customer inquiries – including customer complaints – is something that every firm must do. And customer complaints can provide direct and relevant information on service issues, whether individual or more systemic. Customer complaints handling differs little between regulated monopolies and competitive firms. Having suitable customer complaint handling processes is often a condition of licensing for regulated firms; this is the case in Ontario.

The Board itself has a call centre for handling customer inquiries and complaints, has internal

processes for responding to written and e-mailed complaints, and also uses an independent agency to handle complaint resolution between firms and their customers. The Board has systems for tracking and analyzing complaints, both individually and in aggregate. (Utilities of sufficient size would in all likelihood also have systems for recording, tracking, and analyzing customer complaint data.)

However, while valuable, customer complaints have some limitations as service performance measures. By their nature, customer complaints are negative and one-sided; they convey what has gone wrong, but generally give no information on what is being done properly. Complaints are also selective. There is only information on incidents of poor performance where the customer has complained; incidents where the customer doesn't complain are unknown. While incidents where the customer doesn't complain may be less serious than those where the customer complains, the former may outnumber the latter. Also, customers are more likely to complain about certain issues or aspects of service than about others. As a result, customer complaints do not provide a representative picture of the firm's overall service performance.

Complaints received by the Board (through its call centre or directly addressed to Board Members or to staff) are further filtered – a customer will typically call or send a letter or e-mail to the Board only after first contacting the utility and then still being dissatisfied with the utility's response. Complaints thus received by the Board will tend to be different in nature and in tone than are the majority of complaints handled by the staff of distributors.

A complaint is also not incontrovertible evidence of poor service by the utility. It is related to one or more experiences of the customer who is dissatisfied with some issue. A difficulty is that, with restructuring, there are now new players and new rules. Customers may not understand this, nor may they want to; they only want the service to be "right" (from their perspective). They will often direct complaints first to the distributor, as they did before restructuring. This is natural; as even under restructuring, the customer maintains a physical and business relationship with the distributor.

Measures of customer complaints are frequently included in service quality reporting. Such data are often aggregate. Assessment of performance with respect to customer complaints is often on the basis of temporal trends, or possibly with respect to complaints normalized by the size of the utility (e.g. per 1000 customers). As is documented in section A.2, in some jurisdictions, standards may be set, and may even be associated with financial rewards and penalties. Such approaches are not uncontroversial given the qualitative, and generally unrepresentative, nature of complaints.

Nonetheless, customer complaints are a rich source of qualitative data. Complaints can corroborate quantitative information provided by other measures, while also identifying service issues not covered by the reported indicators. They can thus be an important component of a service quality regulatory regime.

Proposals should consider whether reporting of customer complaints data is warranted.[17] Specific proposals on what complaints data should be reported, and if there should be any thresholds associated with complaints indicators, should be addressed.

5.2.8.3 Worst-performing Circuits

Another "measure" that is monitored in some jurisdictions is "worst-performing circuits". Rather than a single measure, this is a tabulation of a utility's circuits that performed the worst over the previous year. The concept is that customers served by these circuits are receiving the worst service and that, in consequence, these are the portions of the network most in need of replacement or rebuilding.

In addition to list of problem circuits, the utility may have to file a report or plan on how and when it expects to address the problem areas. However, even if it is not used for regulatory purposes, the worst performing circuits may be measured and used by the utility for its original purpose – of providing guidance to network engineering and operations staff of the utility of problem areas in the network, which in turn would be priority candidates for refurbishment or replacement.

This measure was not identified or proposed in the development of the first-generation PBR, but was noted as a potential SQI for Hydro One Network's transmission business during stakeholdering conducted in September 2002. If it is used in other jurisdictions and also seems plausible for the transmission sector, then it would also be worthy of consideration as a distribution "SQI".

The extent to which Ontario electricity distributors use "worst performing circuit" measurement for operational management of their systems should be examined. Any discussion must address the length of a "worst performing circuit" list, particularly given the variability in the sizes of Ontario electricity distributors. For example, should smaller LDCs have shorter lists than larger LDCs (as they have fewer circuits)? How is "worst performance" defined? What should be the regulatory actions repercussions of have a circuit appearing on the "worst performing circuit" lists, particularly on a recurring basis?

5.2.8.4 Metering and billing accuracy

Meter-reading and billing are important services, and are integral to the provision of distribution service. Reading the meter and issuing an accurate bill on a timely basis are important both for the utility to manage its cash flow and for the customer to manage his or her budget.

Metering and billing are aspects of service measured in other jurisdictions, and in other

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[17]Section 2.3.1 of the Reporting and Record-keeping Requirements requires utilities to track relevant complaints data. Data are not reported unless requested by the Board.

industries[18], although no indicators specific to these service aspects were required for first-generation PBR. These aspects may be partially covered through complaints and also through Indicator 5: Written Responses to Customer Inquiries (since billing issues would form a large fraction of account inquiries), but these measures do not provide direct and quantitative assessments of the "quality" of metering and billing.

In electricity and in natural gas, measurement of the "quality" of meter-reading and billing is complicated by industry practices of estimated consumption, equal billing plan ("EBP") options, and variable meter-reading frequencies.

Infrequent meter reading – often every other month for residential and other low usage customers and even less frequent for "seasonal" customers – means that customers will frequently be faced with a bill based on estimated consumption. Algorithms used for estimating consumption between actual meter reads – using history, heating or cooling degree days, and wholesale metered electricity – can give reasonable estimates. However, how does one define the accuracy of bills based on "estimated consumption"?. Equal Billing Plan options, while beneficial to customers for budgeting for their electricity bills, diminish short-term concerns about the accuracy of meter-reading and billing. Billing options and information exchange between the distributor and the retailer may also be a factor for retailer-supplied customers.

These factors complicate the assessment of meter-reading and billing performance, but do not alter its importance. Arguably, these aspects of service become more critical under the restructured and competitive market, where customers face a variable commodity price. Accurate billing information will constitute a primary data source for customers to educate themselves about their consumption pattern and the "real" price of electricity, and thus become able to make informed decisions. Thus, meter-reading and billing service quality becomes an important facilitator of competition. Technological and operational changes, such as interval meters, remote metering, and even use of the Internet for the customer to provide his or her own reading, may improve this aspect of service over time.

Consideration should be given as to whether reported service quality indicators of metering and billing is appropriate and warranted. If judged appropriate and warranted, suitable measures, particularly those already being measured by the utility for its own operational management purposes, should be discussed. Appropriate standards and other thresholds should also be advanced.

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[18]Percent of accounts whose meters are read every two months is an indicator reported by Enbridge to the Board. While it does not directly measure the accuracy of bills, ensuring that bills are based on actual meter reads helps to ensure that, for an individual customer's account, the variance between actual and estimated consumption does not become too large.

5.2.8.5 Service quality related to competitive services

Where restructuring has resulted in retail competition, distributors find that there are new entities that they must interact with – retailers. Distributors must now keep track of whether a customer is purchasing the commodity from default supply (called Standard Supply Service in Ontario) or from a particular retailer. The customer is physically connected to the distributor, but the customer retail arrangement may affect the customer's billing arrangements. With retail competition, distributors must maintain this information, and must process requests – typically received from the retailers rather than from the customers – for switching customers between retailers or from or to default supply. Orders to switch customers between, or to or from, retail suppliers are called Service Transaction Requests, or "STRs", in Ontario.

While STR processing is seen as a service to the retailers, it is also a service to the end customers. Prompt and accurate processing of STRs facilitates customers exercising retail choice, and hence is a facilitator of competition.

Handling of customer account information to facilitate retail switching and billing is an important but technical area, dealing with business systems, information security, staff training, and legal and regulatory matters. Jurisdictions typically establish requirements in these areas to facilitate the development of competition and to curb abuses (such as giving preferential treatment to competitive affiliates). In Ontario, requirements for STR processing are contained in the Distribution System Code (the "DSC") and in the Retail Settlement Code (the "RSC"). Compliance with the DSC and RSC are conditions of the licences of distributors and retailers.

Performance monitoring of STR processing is not frequently encountered in restructured energy industries – to date – although the importance of customer switching is recognized in several. However, as restructured energy markets, particularly with full retail competition, evolve, the quality of service provided by distributors to retailers and retail customers may come under closer scrutiny.

Consideration should be given whether such measures are warranted; the evolution of the Ontario market and existing requirements in the DSC and RSC are important factors. If measures of services to competitive firms, are warranted, specific proposals for indicators and appropriate standards and thresholds should be advanced.

5.2.9 Service Quality Audits

Many rigorous service quality regulatory plans include an audit process. The intent of the audit process is, at a minimum, to check that a regulatee has the appropriate measurement plans in place and that measurement is conducted and reported in an accurate and unbiased manner. The audit process may also examine related operational procedures and processes to ensure that the firm's management and employees receive, and understand, and can (and, as necessary, do) react to the results, particularly to remedy problems.

The intent of such an audit process is to provide the regulator, and the general public, with some confidence that firms are appropriately and accurately measuring, reporting and managing their performance. Audits and inspections may also be done to specifically investigate persistent and significant performance problems, although in such cases the audit and investigation process may be considered as part of the regulatory response to below-standard performance.

In the proceeding to develop first generation PBR, the Consumers' Association of Canada and the Power Workers Union suggested that the reported SQIs should be subject to some form of audit or review. The Board did not make a ruling on this concept, except to state that it would review the reported SQIs for the first year.

While the Board has been reviewing the SQI data since it was first filed in 2001, the primary intent was to ensure that utilities start measuring and reporting the data. The data, and discussions between utility and Board staff have identified concerns about probable inconsistency in reporting.

Service quality audits are typically less developed than are audit processes for financial data. There are several factors influencing this. Service performance is typically perceived as "softer" and more subjective compared to financial data. Also, the relationship between service performance and the "bottom lime" is less direct than is revenues and expenses.

It may also be that the role of the service quality audit is subsumed, in whole or in part, by other types of operational audits. It will often be the case that an operational audit of a function such as installation and repair will review the qualifications of personnel, and their adherence to established procedures, but also that related systems (i.e. work order, job tracking) are being used to appropriately record relevant information; such systems are often the source of operational performance measures.

For their own purposes, firms may conduct operational or service quality audits for their own purposes – as a check that their internal operations are working properly and effectively, and to identify where improvements can be made. Such audits processes may be internal, or the firm may employ external auditors. The requirement for such audits is almost mandatory where operational or service performance results are tied to remuneration; this is to ensure the accuracy of results upon which employees are paid.

Because of above considerations, and also reflecting the relative newness of formal service quality regulation in many industries and jurisdictions, service quality audits, as part of the regulatory plan, have been used infrequently. As formal service quality plans become more established, so too do service quality audit processes become more established as part of those plans. This evolution is augmented by the fact that financial consequences (rebates, rewards and penalties) are being implemented in such plans as part of the adoption of PBR forms of regulation.

Audits are typically conducted at random, although the probability of selection may be

influenced by certain other factors. A utility that reports persistent poor performance could have a higher probability of being audited, so that the regulator can assess whether the firm is appropriately measuring and managing its performance, and to make recommendations to the firm to these ends.

Consideration of the role of service quality audits, therefore, may cover the following:

1) The extent to which LDCs currently do operational and/or service quality audits. If these are being done, are they done by internal or external auditors? Could the filing of such internal or external operational/service quality audits be an alternative to service quality audits conducted by (or on behalf of) the regulator?;
2) What should be the frequency of audits, and what criteria should be used to influence the probability that a utility is audited; and
3) The intended use(s) of service quality audits and investigation – to assess the accuracy of performance measuring and reporting, the adequacy of utility processes of operational processes for monitoring and managing service performance, and in support of actions by the regulator to address poor performance not being adequately remedied by a firm.

5.2.10 Review of Service Quality Regulation

As discussed in Section 2.6, a suitable regulatory regime should allow for changes to be made to it. Experience suggests that change is gradual – and consistency of reporting both between entities and overtime is desirable to be able to monitor performance and detect problems and trends – but procedures to allow for justified or necessary changes should be established. Periodic reviews, even if they do not result in changes, do re-establish the currency of the reported indicators, standards and regulatory requirements.

Views and proposals are sought on procedures for:

1) periodic reviews (frequency, etc.); and
2) in-period changes (criteria for justifying, etc.).

6.0 Summary

This discussion paper provides background information on service quality regulation – its underlying principles, the current regime in place for Ontario's electricity distribution industry, and issues that may be pertinent for evolution of service quality regulation as part of the 2nd generation PBR plan. The paper also summarizes service quality regulation as practiced in other jurisdictions and regulated industries. It is recognized that the Ontario electricity industry is not starting out from scratch. The Board, Board staff, the Ontario industry and other stakeholders are much better informed than was the case in 1999.

This document provides stakeholders with information on the theory, practice and issues of service quality regulation issues. This information should facilitate the development of proposals for service quality regulation for 2nd generation PBR, particularly on those issues outstanding from and arising during the first "transitional" PBR regime. To this end, the paper identifies issues that the Board, as documented in its RP-1999-0034 Decision, specifically wanted further consideration of. The paper also identifies other issues that are encountered in other service quality regulatory regimes and that may be worthy of consideration in the review.

While this paper discusses the issues and underlying principles related to service quality regulation, it does not draw conclusions, make recommendations, or forestall consideration of options. However, Board staff, along with the industry and other stakeholders, in exploring these issues, are intent on developing specific proposals that will aid in the achievement of the objectives of the OEB Act and the Board's regulatory mandate, while balancing regulatory burden and the varied needs and interests of stakeholders, including the industry and Ontario consumers.

Appendix Review of Other Jurisdictions and Regulated Industries

Section 4.0 of this paper highlighted the existing service quality regulatory regime for 1st generation PBR for electricity distribution in Ontario. This PBR plan serves as the starting point for this research for second generation PBR, including issues relating to service quality regulation. In its RP-1999-0034 Decision, the Board identified specific issues for further research and consideration, and these are detailed in section 5.1. Section 5.2 outlines other issues that could be considered. Identification of some of these issues is based on the experience of first-generation PBR. However, other issues have been gleaned from a review of service quality regulation, as it is practiced in other jurisdictions and in other regulated industries; it was recognized that research into second-generation service quality regulation should not be conducted in isolation, and that, in fact, much could be learned from other jurisdictions.

There are many examples of service quality regulation, particularly under PBR, that are in existence. This Appendix documents several of these, as practiced elsewhere, both for electricity distribution in other jurisdictions, and in other regulated network-based industries (natural gas, telecommunications, water), pointing out salient features, policy considerations, and experiences. This research is intended to augment knowledge of the issues and approaches to Service Quality Regulation, and to allow parties to consider the issues and options on a more informed basis.

It should be noted that this survey concentrates on regulatory regimes with formal service quality regulation in place. The nature and even existence of formal service quality regulation is not consistent world-wide. Many regulatory jurisdictions do not have formal regimes in place; this does not mean that service quality is ignored, as customer complaints and performance results may enter into considerations of rate and revenue requirement applications and of other regulatory approvals.

However, the incidence and sophistication of service quality regulatory regimes has increased since the 1980s. The need to counterbalance the efficiency-seeking incentive of PBR to ensure that service quality does not suffer from cost-cutting, is one major factor in the growing incidence and importance of service quality regulation.

The Appendix is structured into subsections as follows. First, there is a summary of the service quality regulation applicable to Enbridge and Union Gas – Ontario natural gas distributors regulated by the Board – in their respective PBR schemes. Next, a discussion of other service quality regulatory regimes in Canada, in electricity, natural gas, water and telecommunications, is presented. Examples from international jurisdictions, but with an emphasis on the electricity industry, are presented. A final sub-section will compare the current Ontario electricity distribution SQI regime currently in place with a representative subset of international regimes.

A.1 Service Quality Regulation in Canadian regulatory jurisdictions

This appendix examines service quality regulation as it is currently practiced in various Canadian provincial and federal jurisdictions. While the examples are from regulated network-based industries other than electricity, we feel that they are pertinent. The inclusion of Ontario's natural gas distribution sector is intuitive, as it also is regulated by the Board.

Examples from water and telecommunications seem less intuitive. However, Canadian telecommunications has one of the longest histories of comprehensive service quality regulation in the world. Further, while there are obvious differences between electricity and communications and water – in terms of product, industry structure, technology, and competition – there are many common elements, in terms of legislation and socio-political factors, that result in similar types of regulation. We feel that these Canadian examples can be informative as to the type of service quality regulation that could be appropriate for Ontario's electricity distribution sector.

A.1.1 Ontario – Natural Gas

While the Ontario Energy Board's role as the economic regulator of the Ontario electricity industry is recent, stemming from the coming into force of the *Energy Competition Act*, its economic regulatory role in Ontario's natural gas distribution and supply has a longer history. However, it is only since the passage of the *Energy Competition Act* that the Board has adopted performance-based rate regulation in the natural gas sector; historically, cost-of-service regulation was used.

Enbridge's targeted PBR, approved by the Board in Decision with Reasons EBRO 497-01, was the Board's first experience with PBR. The plan differs from standard PBR mechanisms in that the price cap formula ($GDPPI - X \pm Z$) applies to operations and maintenance expenses, while capital expenditures are subject to cost-plus regulatory review on an annual basis.[19]

In 2001, the Board approved a comprehensive PBR plan for Union Gas. (A third and smaller natural gas distributor in Ontario, NRG, currently remains under cost-of-service regulation.)

Service Quality regulation is a component of both the Enbridge and Union PBR plans. Enbridge files its service performance results annually and publically, and its performance is an automatic "issue" for consideration as part of the capital program review and PBR update. Performance results are reported with a quarterly periodicity.

Table A.1 summarizes the SQI measures reported by Enbridge and Union Gas.

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[19]Enbridge is expected to file an application for a comprehensive PBR scheme to succeed the targeted PBR plan.

Table A.1: SQIs reported by Ontario Natural Gas Distributors

Indicator	Standard	
	Enbridge	**Union Gas**
Telephone Service Factor (Percentage of calls answered within *x* seconds)	75% within 30 seconds	65% within 20 seconds
Meter Reading (Percentage of meters not read within 4 consecutive months)	0.5%	
Emergency Response time (Percentage of calls responded to within 1 hour)	83%	95%
Distribution System Integrity survey (Completion of leak surveys and corrosion surveys annually)	100% completion of annual surveys	100% completion of annual surveys
Gas utilization infractions (Percentage of "red tagged" code infractions outstanding beyond 90 days)	None outstanding except for customer hardship cases.	100% gas shut off beyond the target date

The SQI indicators reported by the natural gas distributors number fewer than those reported by electricity distributors. Some of the indicators (e.g. gas leakage detection) are unique to the natural gas sector, while TSF and Emergency Response are analogous to current electricity distributor SQIs. For TSF, the standards are the same as or higher than the minimum approved standards applicable to electricity LDCs.

In the more recent Union PBR Decision RP-2000-0017 (July 2001), the Board concurred that additional SQIs, in the areas of service provisioning (e.g., new connections, appointments met) merited consideration, but that development of these should follow some experience with PBR and the Board's Decision on the Gas Distribution Access Rule. The Board also considered that, following the first year's experience with PBR, Union should advance a proposal, as part of its customer review process, for a customer survey to evaluate customers expectations and experiences with Union's service quality. The Board also agreed with Union that penalties associated with poor service quality would also be dealt with through the customer review process.

A.1.2 Canada – Electricity

Energy regulation is split between provincial and federal jurisdictions. Intra-provincial matters, such as electricity generation, distribution and retailing, and natural gas distribution, and licensing matters, are the purview of provincial regulators. Inter-provincial matters are overseen by the National Energy Board.

The existence and formality of service quality regulation varies from province to province. In general, provincial regulators that have embraced PBR have are more advanced. The British Columbia Utilities Commission has service quality monitoring in PBR plans for both natural gas and electricity distributors that it regulates. The Alberta Energy Utilities Board (AEUB) has

some monitoring, and is doing work to develop a consistent set of performance measures.[20].

Service quality regulation appears to be less developed in the Maritimes. The Newfoundland Public Utilities Board monitors SAIDI and SAIFI, and also another index – SARI or System Average Restoration Index (being the ratio of SAIDI to SAIFI, equal to CAIDI), as well as reports on service outages. The Regie de l'energie does not have formal service quality monitoring for electricity distribution, but regulates the service quality of Gaz Metropolitain, the major natural gas distributor, as part of its rate regulatory plan.

Even where service quality regulation has not been formalized, service performance is examined to some degree in rate applications. Firms will often report operational statistics, and performance may be compared to that of other Canadian utilities as reported through a regular study done through the Canadian Electricity Association.

A.1.3 Canada – Telecommunications

The Canadian telecommunications industry has probably one of the longest surviving service quality regulatory regimes in place. Following review of service performance as part of revenue requirement and rate applications of federally-regulated telephone companies ("telcos"), the CRTC implemented a service quality reporting regime beginning in 1982 (Telecom Decision CRTC 82-13). The initial regime was comprehensive, involving quarterly reporting of performance on a wide variety of indicators. The number and type of indicators, and the associated standards, were specific to each telco, taking into account its size and capabilities. Bell Canada, as the largest telco, was at one point reporting over 60 indicators and sub-indicators, and a further 16 indicators for remote communities in Northern Ontario and Québec.

As part of its assumption of telecommunications regulation in all of Canada, along with facilitation of competition in telecommunication and the move to price cap regulation, the CRTC initiated a review of its service quality regulatory regime in late 1994. In Telecom Decision CRTC 97-16, the CRTC adopted a new service quality reporting regime coincident with the onset of price cap regulation on January 1, 1998. The number of indicators, and the scope of the filing requirements was reduced. The incumbent telcos serving more than 25,000 customers – provincial telcos and a few large independent telcos – file performance on a quarterly basis but on a smaller number of indicators related to monopoly (and emerging competitive) services. Remedial action reporting was required for instances of persistent below-standard performance. The CRTC considered issues of formulaic approaches for customer rebates, penalties and a Q-factor adjustment to the price cap mechanism, but did not adopt formulaic approaches for the first price cap regime. Since 1998, there have been a number of decisions revising the service quality regime, adjusting standards and introducing some new indicators.

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[20]The AEUB announced a stakeholder consultation on Service Quality Plans for Gas and Electric Regulated Rate Providers and Electric Wire Owners on August 28, 2003. See GB 2003-31 www.eub.gov.on.ca/BBS/requirements/ils/gbs/gb2003-31.htm

In its review of the price cap regulation for the provincial telcos, the CRTC identified service quality as an issue for consideration as a part of the second-generation price cap plan. This included to consideration of there being financial consequences for degraded service, implemented through a formulaic approach, The CRTC issued its second-generation price cap plan in Decision 2002-34 on June 30, 2002. The CRTC adopted an interim service penalty plan in that Decision. On March 27, 2003, the CRTC followed up by issuing Public Notice 2003-3, commencing a proceeding to develop a final service quality penalty mechanism as part of the telecom price cap plan. This written proceeding is in progress at the time of writing.

In a recent decision (Decision CRTC 2001-756), the CRTC has adopted a PBR regime for the regulation of 39 independent telcos; all but one of these are located in Ontario and Québec. These independent telcos provide local (and in some cases, long distance) telecommunications services in smaller communities. These independent telcos serve from a few hundred customers up to nearly 25,000. While most are privately owned, some are municipally owned. The nearly 20 independent telcos in Ontario are, in many respects, analogous to electricity LDCs, in terms of size, service areas, and operating environments.

The economic regulation of these independent telcos has changed in the past decade. They were subject to provincial regulation[21] until the early 1990s, when, following Supreme Court decisions in 1989 and 1992, they came under federal regulation. The CRTC adopted a simplified form of cost-of-service regulation in Telecom Decision CRTC 96-3. In that decision the CRTC indicated that it would rely on customer complaints to monitor the quality of service of the independent telcos.

This changed with the adoption of PBR for the independent telcos beginning January 1, 2002. In Decision CRTC 2001-756, the CRTC indicated that it would monitor the following five SQIs for the independent telcos:

Table A.2: SQIs for Smaller (< 25,000 customers) Independent Telcos

Indicator
Number of customers not provided with (new) service within 10 days of the date of the customer's request
Number of Initial Out-of-Service Trouble Reports Not Cleared Within 24 Hours
Number of Customers who Reported a Trouble with their Service
Number of Customers who Reported that their (Telephone Directory) Listing in the White Pages was Either Omitted or Erroneous
The Number and Nature of Written and Verbal Complaints Address to Officers and/or Department Heads of the Telephone Company and/or to the Commission (the CRTC).

It is interesting that the CRTC is monitoring performance in terms of actual counts, rather than performance expressed in percentage or index terms. It has not established standards because

[21] In Ontario, the economic regulator was the Ontario Telephone Securities Commission.

the monitored numbers are counts, but many of these measures could be normalized based on telco size (e.g. number of customers).

In a subsequent Decision (Decision 2002-43), the CRTC adopted PBR for two larger independent telcos in Québec, Télébec and Telus (Québec) consistent with the second-generation price cap applicable to provincial telcos. However, Télébec and Telus (Québec) were, since 1998, subject to the same quality of service regulation applicable to provincial telcos, and this was unchanged by Decision 2002-43.

A.1.4 Canada – Water

The Edmonton City Council passed a bylaw on June 14th, 2001, which established performance-based rates for EPCOR for the upcoming five-year period. As part of this framework, EPCOR must satisfy a number of standards related to customer service, water quality, reliability, safety, and the environment. Deficient performance in any of these categories, each of which has an associated index, will invoke financial penalties that will be passed through to customers as refunds in the following year. The approach is highly formula-driven, with each index point below the target level bringing a $53,000 penalty, up to a maximum of 5% of water services' net income ($800,000 per year) subject to rebate.

The five indices represent mathematical composites of several indicators, as follows: reliability (water main break frequency and duration, planned interruptions, water pressure, and water losses), water quality (percent of satisfactory tests), customer service (satisfaction and response time), environmental (success of various programs that minimize adverse environmental impacts), and safety (success of programs designed to maximize employee and public safety). As with the majority of the SQI plans reviewed, there is no symmetric reward scheme for exceeding target levels of service quality. Table A.11 includes a summary of the SQIs monitored in the Edmonton Water regulatory plan.

A.2 International

In the following subsections, we review the service quality regulatory plans in place in electricity, and in related network-based industries (natural gas, telecommunications, and water), in various international jurisdictions. The focus is on the United States, the United Kingdom, Australia, and New Zealand on the basis that:

- these industries are sufficiently well-developed (technologically, organizationally, and in having established economic regulation), such that they are comparable with Canada;
- they have experience with regulatory reform of these industries, with the aim of implementing incentive-based forms of regulation and of introducing competition where practical. In this sense, they have either undertaken reform before Ontario did for its energy sector, or they are currently undergoing reform; and
- their societal, economic, legal and governmental framework is sufficiently analogous to the Canadian and Ontario situations that their experiences can be at least informative and

possibly relevant to the Ontario situation.

While the following discussion is not exhaustive, it provides some varied but pertinent examples of how service quality regulation is practiced.

A.2.1 Electricity

This section reviews the service quality regulatory plans in place for electricity distributors in other jurisdictions. The focus is on the United States, the United Kingdom, Australia, and New Zealand. The examination of the United States is selective, focusing on service quality regulatory plans for a few utilities in a few states. These examples are illustrative of indicators being monitored and the regulatory approaches used, particularly with regard to reward/penalty schemes. The United Kingdom, Australia (using the state of Victoria) and New Zealand are also insightful because these jurisdictions have undergone reform of electricity regulation and have implemented formal service quality regulation as part of their regulatory reforms.

A.2.1.1 United States

This section covers the service quality regulatory plans of a selected sample of electricity distributors. With 50 states, embracing a wide variety of economic regulation ranging from classical Cost-of-Service/Rate of Return regulation, a complete analysis would be significantly larger. As has been recognized in other studies, many state jurisdictions do not have formal service quality regulation, while others may not be as instructive as the ones cited in this paper. Some states have also not adopted PBR or initiated regulatory reform.

A.2.1.1.1 San Diego Gas & Electric (California)

The California Public Utilities Commission (CPUC) established a wide array of performance standards for San Diego Gas & Electric (SDG&E). Table A.3 provides an overview of the service quality scheme.

In addition to reliability and customer service indices traditionally monitored in SQI regimes, the CPUC included a provision to encourage improvements in employee safety and health. Such an SQI may be worth investigating if utilities have exhibited poor historical performance in terms of time lost to accidents or sickness, which might be revealed by complaints to local labor authorities. Worker lost time may have some influence on performance in other aspects, such as meeting appointments and service restorations. However, workplace safety is normally not the purview of the electricity regulator (as was the determination of the Board in its RP-1999-0034 Decision).

Table A.3: Electricity Service Quality Indicators for San Diego Gas and Electric

Indicator	Benchmark	Deadband	Unit of Change	Incentive per unit	Maximum Incentive
Safety (injury/illness time relative to total workable)	8.8	±0.2	0.1	US$25,000	±US$3M
SAIDI	52 minutes / year	0	1	US$250,000	±US$3.75M
SAIFI	0.9 outages / year	0	0.01	US$250,000	±US$3.75M
MAIFI	1.28 outages / year	0	0.015	US$50,000	±US$3.75M
Customer satisfaction with recent service transactions	92.5%	±0.5%	0.1%	US$75,000	±US$1.5M
Call centre performance: calls answered within 60 seconds	80%	0	0.1%	US$10,000	±US$1.5M

Deadbands around the benchmarks are extremely narrow, with none at all for the service reliability indices. The scheme is symmetric with respect to rewards and penalties, which is fairly typical among U.S. programs, although highly unusual from an international perspective. The amount of the penalty or reward increases incrementally with each unit of divergence from the target level, with relatively high prescribed maximums.

In addition to evaluating SDG&E annually for its performance relative to benchmarks, the CPUC has stipulated a number of credits that must be provided to customers in specific instances in which SDG&E's customer service proves to be deficient (e.g., a $15 bill credit if SDG&E fails to turn on a new customer's service on the promised day without providing 24 hours' notice of postponement). As is customary in nearly all the quality plans reviewed, exceptions are made for certain events beyond the distributor's control. For example, "major events" (including storms and natural disasters) and planned outages are excluded from the calculation of the interruption indices. The inclusion of the MAIFI index helps compensate customers for the momentary outages that can cause a surprising degree of inconvenience and disutility.

A.2.1.1.2 *Southern California Edison (California)*

Prior to setting up the SQI scheme for SDG&E, the CPUC imposed a somewhat different set of performance regulation on Southern California Edison (SCE). Table A.4 reveals that the overall structure is similar, in that each performance target is surrounded by a deadband range beyond which per-unit penalties and rewards are levied for deviations from the benchmark.

However, the indicators measured are slightly different from SDG&E's, due perhaps to differences between the reliability and safety data gathering processes at the two utilities. This underscores the importance of tailoring indicators, where necessary, to the information technology capabilities of utilities, to minimize the costs of collection; it also highlights the difficulties in benchmarking performance between utilities, even within the same jurisdiction.

The per-unit penalties and maximum payouts are much higher than for SDG&E, in recognition of SCE's significantly greater annual revenues. Mention must be made of the benchmarks for ACMI and outage frequency, which have been adjusted each year in a different fashion. The ACMI target was initially pegged at 59 minutes but has subsequently been lowered by two minutes each year; meanwhile, the outage frequency target is revised annually to reflect a rolling average of the two preceding years.

Table A.4: Electricity Service Quality Indicators for Southern California Edison

Indicator	Benchmark	Deadband	Unit of Change	Incentive per unit	Maximum Incentive
Safety total accidents and illnesses per 100 employees)	13	±0.3	0.1	US$555,000	±US$5M
ACMI (Average customer minutes of interruption)	49 minutes / year	±6	1	US$1M	±US$9M
Outage frequency	10,900 outages / year	±1,100	183	US$1M	±US$9M
Customer satisfaction in 4 areas (field services, local offices, call centres, service planning)	64%	±3%	1%	US$2M	±US$10M

A.2.1.1.3 *New Century Energies (Colorado)*

Although Colorado has yet to reform its electricity industry, its Public Utilities Commission saw fit to implement an SQI program for the Public Service Company of Colorado shortly after it merged with Southwestern Public Service Company to form New Century Energies (NCE) in 1997. The plan, which took effect as of November 1998, is summarized in Table A.5.

This plan analyzes fewer indicators than most, but provides some oversight of both system reliability and customer service. No incentives (rewards) are provided to improve customer service beyond the benchmark level, while the penalties quickly steepen as performance deteriorates.

System reliability is gauged solely with SAIDI (duration), meaning that the frequency with which outages occur is not addressed. But, unlike with customer service, NCE can earn progressively increasing rewards for superior performance regarding outage duration. These rewards operate in conjunction with an earnings sharing mechanism inherent in NCE's PBR-determined rates: if a reward is merited under the service quality plan, NCE's share in earnings above the established return on equity (ROE) threshold will increase by exactly the amount of the reward (and thus the share of PBR gains refunded to ratepayers will decrease). By contrast, if NCE's reliability performance merits a penalty, it must disburse to ratepayers the total bill credit associated with its degree of divergence from the benchmark, as outlined in the above table.

At each annual review, the SAIDI benchmark and bands are adjusted based on the highest single

SAIDI observed in the surrounding region as well as NCE's outcomes. In fact, all bill credit schedules are subject to upward or downward adjustment based on NCE's performance in the previous year; if any bill credit is assessed, the next year's potential credits for that performance measure are increased by predetermined amounts.

Table A.5: Service quality indicators for New Century Energies

Complaints per 1000 customers	1st year bill credit
<0.8	US$0
0.8<X<0.9	US$250,000
0.9<X<1.0	US$500,000
>1.0	US$1M

Calls answered < 45 seconds	1st year bill credit
>70%	US$0
60%<X<70%	US$250,000
50%<X<60%	US$500,000
<50%	US$1M

System SAIDI (Minutes)	Bill credit/reward	
>106	US$3M	bill credit
96<X<106	US$2.25M	bill credit
86<X<96	US$1.5M	bill credit
71<X<86	US$0	deadband
61<X<71	US$1.5M	reward
51<X<61	US$2.25M	reward
<51	US$3M	reward

Note: the targets at left applied in 1997. In successive years, the system SAIDI would be compared with the highest single regional SAIDI (as a benchmark), and the bands and associated rewards would be adjusted.

Note that only 1st year bill credits are presented. In successive years, the amounts of these credits would increase or decrease based on the previous year's performance.

A.2.1.1.4 *Consolidated Edison (New York)*

As a component of its restructuring settlement with the New York State Public Service Commission in August 1997, Consolidated Edison (Con Ed) agreed to a series of service quality and reliability measures. These are summarized in Table A.6.

It is important to note that a full review of Con Ed's performance with respect to these SQIs is only triggered if the company fails to meet certain standards in any of four separate areas: number of complaints per 100,000 customers (maximum allowed is 8.99), handling of emergency calls, handling of regular calls, and handling of service center visits (the latter three assessed through a customer survey administered annually).

Table A.6: Service quality indicators for Consolidated Edison

Indicator	Deadband	Band 1	Basis Points	Band 2	Basis Points
New and initial service jobs: from request to issuance of service layout.	< 7.5 days	7.5-8.3	-2.08	>8.4	-4.17
New and initial service jobs: from request to completion	< 10 days	10-10.9	-2.08	> 11	-4.17
Meter reading (percent read on schedule)	>86.9%	86-86.9%	-2.08	• 85.9%	-4.17
Phone call answer rate	> 94.9%	93.6-94.9%	-2.08	• 93.5%	-4.17
SAIFI for radial systems	350-357	<350	+2.5	>537	-2.5
SAIFI for network systems	7.54-13.55	<7.54	+2.5	>13.55	-2.5
CAIDI for radial systems	1.18-1.81 hours	<1.18	+2.5	>1.81	-2.5
CAIDI for network systems	2.27-3.5 hours	<2.27	+2.5	>3.5	-2.5
Billing accuracy (Percentage of bills not adjusted for company error)	>97.2%	95.8-97.2%	-2.08	• 95.7	-4.17
Percent of routine investigations done in 30 days	>94.9%	93.7-94.9%	-2.08	• 93.6	-4.17
Note: **"Basis points"** represent penalties/incentives to the company's allowed return on common equity (revenue requirement). These indicators are only examined if ConEd falls short of minimum standards in any one of four measures: complaints per 100,000 customers and surveyed customer satisfaction with: handling of emergency calls, regular calls, and service center visits.					

As with NCE, no incentives are built into the customer service measurements to counterbalance the penalties. Beyond the deadbands (which extend downward from the standards), a narrow tier of moderate penalties quickly gives way to a second band with heavier penalties. However, for the reliability indicators, penalties and rewards are symmetric around fairly sizeable deadbands. The targets for the reliability indicators are differentiated between radial and network systems, and, unlike the case for NCE, both frequency and duration of outages are scrutinized. Penalties and rewards for all indicators are applied through a formulaic approach in terms of "basis points" on common equity, which essentially represents an adjustment to the company's allowed revenue requirement. Any penalties that are incurred are credited to ratepayers in the following year, with a ceiling adjustment of 35 basis points per year.

A.2.1.1.5 National Grid USA (Massachusetts)

Analogous to the NCE example, the Massachusetts Department of Telecommunications and Energy (DTE) stipulated that Eastern Utilities Association and National Grid USA (NEES) accept the imposition of service quality measures as a condition of approval of their merger in March 2000. The resulting incentive and penalty scheme is documented in Table A.7.

Table A.7: Service quality measures for National Grid USA

Indicator	**Frequency of Outages**				
Thresholds (per customer per year)	1.46	1.35	1.24	1.13	1.02
Incentives and Penalties	-US$2M	-US$0.5M	US$0	+US$0.5M	+US$2M
Indicator	**Duration of outages**				
Thresholds (minutes / outage)	113.84	101.59	89.34	77.09	64.84
Incentives and Penalties	-US$2M	-US$0.5M	US$0	+US$0.5M	+US$2M
Indicator	**Distribution line losses**				
Thresholds	to be determined	to be determined	3.98%	to be determined	to be determined
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Customer satisfaction**				
Thresholds	88.4%	89.9%	91.4%	92.9%	94.4%
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Customer contact satisfaction**				
Thresholds	72.7%	74.8%	76.9%	79.0%	81.1%
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Calls answered < 20 seconds**				
Thresholds	66.4%	68.4%	70.4%	72.4%	74.4%
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Meters read each month**				
Thresholds	85.9%	88.6%	91.3%	94.0%	96.7%
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Complaints / 1,000 customers**				
Thresholds	0.96	0.88	0.80	0.72	0.64
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Lost time accident rate per 200,000 man-hours**				
Thresholds	1.98	1.73	1.48	1.23	0.98
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M
Indicator	**Restricted work rate per 200,000 man-hours**				
Thresholds	6.93	6.28	5.63	4.98	4.33
Incentives and Penalties	-US$1M	-US$0.25M	US$0	+US$0.25M	+US$1M

As in California, this SQI scheme includes employee safety along with system reliability and customer service. Each benchmark "target" is surrounded by two tiers of symmetric penalties and incentives, with all but the outage frequency and duration measures providing a maximum penalty/reward of US$1,000,000. The implied regulatory assumption is that these aspects of service are valued equally by customers, while service reliability is considered twice as valuable.

Targets were established initially based on five-year rolling averages of the two merging

companies' historical performance, with no reliance on comparator utilities. The threshold values reflect one and two standard deviations on either side of the target.

Despite the symmetry in the incentive/penalty structure, maximum penalties are constrained to US$9 million per year while maximum incentives could float to US$12 million. Rather than immediately remunerating the distributor or ratepayers (as is done in other US state regimes examined above), the DTE deposits all incentives and penalties into an account designed to accumulate through the termination of the quality plan in 2009. If the account ever exceeds US$20 million in either incentives or penalties, the excess would be either sought from or returned to ratepayers. The design of this mechanism, cumulative over a number of years and subject to a certain threshold before it any penalty or reward is activated, may tend to reduce the incentive to improve, or even maintain, service levels.

A.2.1.1.6 *Mississippi Power & Light (Mississippi)*

Beginning in 1995, Mississippi Power & Light (MP&L) has been regulated under a unique PBR plan that involves both earnings sharing and service quality adjustments. At the annual rate review, the regulator computes a Performance Rate Adjustment (PRA) index comprised of three distinct indicators: retail price (which receives 40% of the weight), customer satisfaction (30%), and network reliability (30%). The price component involves examining the percentage change since the base year (1994) in the ratio of MP&L's average retail revenue per kWh to the average retail revenue per kWh of other utilities in the Southeastern Electric Exchange. For the customer satisfaction component, the regulator calculates the percentage change since 1994 in the class-weighted number of customers who give MP&L either a 4 or 5 rating (on a scale of 1-5, with 5 being the highest) in a survey of their satisfaction with power quality, billing, customer service, and other aspects of the utility's business. Finally, the reliability component measures the percentage change since 1994 in an index strongly resembling SAIDI.

The PRA derived from these three constituent parts is then added to (or subtracted from, if aggregate performance has worsened) the utility's actual rate of return on rate base (calculated as net operating income over rate base), and this adjusted rate of return is compared with a benchmark level. If the adjusted ROR is different from the benchmark by more than 0.5% in either direction, it is converted into a rate adjustment that effectively raises or lowers allowable revenues in the coming year.

This approach effectively penalizes MP&L for poor service quality by increasing the earnings shared with ratepayers, and therefore encourages it to continue to sustain quality levels equal to or better than those attained in the base year. Thus, while this SQI regime utilizes a formulaic approach, the formula is applied to the allowed rate of return rather than affecting rates directly (i.e. through an adjustment to a price cap formula) as in other programs surveyed in this report.

A.2.1.2 United Kingdom

In the United Kingdom, performance standards have been in place since 1991, undergoing a series of revisions and strengthening over the past decade. A summary of the guaranteed quality standards currently in effect is presented in the following table. There are also indicators and standards with no monetary penalties attached; distributors must report these measures and their performance in these areas are published annually to inform consumers.

Table A.8: Service Quality Indicators for the U.K. Electricity Distribution Industry

Service Aspect	Benchmark	Penalty
Responding to failure of fuse	<3 hours on weekdays, <4 hours on weekends	£20
Restoring supply after fault	<18 hours	£50 domestic, £100 non-domestic; £25 for further 12-hour periods
Providing supply and meter	Arrange appointment within 2 days for domestic customers, 4 days for non-domestic customers	£20-100
Estimating charges for connections and meter alterations	<5 days for simple jobs, <15 days for more complicated ones	£20
Notice of planned interruptions	5 days notice	£20 domestic, £40 non-domestic
Investigation of voltage complaints	Visit within 7 days, or substantive reply within 5 days	£20
Responding to meter problems	Visit within 7 days, or substantive reply within 5 days	£20
Responding to customer queries about charges and payments	Substantive reply and agreed funds paid within 5 days	£20
Keeping appointments	Required	£20
Notifying customers of payments owed	Payments within 10 days	£20
Responding to prepayment meter faults	<3 hours on weekdays, <4 hours on weekends	£20

The UK structure differs from those adopted in the United States in several respects, the most obvious being its design as a "pay-as-you-violate" system of penalties for many indicators rather than an annual review and corresponding rate adjustment. In the UK, the regulatory body Ofgem (Office of Gas and Electricity Markets) conducts annual examinations of distributor reliability performance and publishes its findings[22]. Moreover, Ofgem requires each distributor to submit a

[22]Responsibility for publishing these reports beginning October 1, 2001 was assumed by another government agency, energywatch (www.energywatch.gov.uk), which functions as a consumer protection and advocacy agency.

large compendium of data on service quality every year, which is also made public for review by customers and competitors. But while these publications may motivate increased efforts by distributors lagging behind their rivals, they have had little bearing historically on annual rate determinations. Rather, distributors incur penalties throughout the year on a per-incident basis, whenever they fail to attain the benchmarks itemized in the table above.

The customer service guarantee programme is perhaps weighted more toward maintaining a minimum customer service standard than addressing power interruption shortcomings of individual distributors.

More recently, Ofgem's Information and Incentives Project ("IIP") was designed to strengthen the incentives of companies to deliver the appropriate quality of consumer to services. A feature of the IIP is the inclusion of indices like SAIDI and SAIFI as well as equipment failure rates in a new incentive-oriented reliability regime, built with benchmarks and symmetric penalty/reward bands. The IIP, which was begun in December 1999, was implemented in April of 2002 after an extensive stakeholder consultation process. The current incentive scheme is in effect from April 2002 to March 2005. From 2005 onwards, Ofgem plans to update its incentives based on results from the 2002-2005 period. The major features of the IIP as it currently stands are as follows:

- a penalty mechanism of up to 1.75% of revenue for failure to meet quality of supply targets;
- a reward mechanism for exceeding quality of supply based on discos' individual rates of improvement; and
- commitment to rewarding frontier performance in the future price control periods; and
- a penalty/reward mechanism up to 1.25% of revenue for quality of phone response to consumers.

Ofgem sets the reference performance level at different levels for distributors, depending on individual performance. Ofgem's goal is to accurately record a base line performance level, while avoiding penalizing those discos which have already implemented improvements. Reference performance levels are calculated as follows:

- if 2001/2002 performance was worse than the 2004/2005 target, then the reference level is 2001/2002 performance;
- if 2001/2002 performance is better than the 2004/2005 target, then the 2004/2005 target is the reference performance level; and
- targets are also adjusted for any changes a disco has made in either its measurement systems or reporting definitions that would alter future reported incidents

To benchmark best-in-group performance, Ofgem has normalized individual disco performances, based on the network characteristics and customer density of each distributor.

There is a reward mechanism for significantly improved performance. To earn the maximum reward, a distributor must achieve a 15% decrease in the number of interruptions and 20%

decrease in the duration of interruptions with respect to its reference level. Lesser improvements result in prorated rewards.

Ofgem offers a firm a limited opportunity to challenge target performance levels if the firm believe that changes in its reported performance are due to changes in measurement systems rather than any real change in their underlying performance. For example, in 2003 one distributor applied for re-basing of its target levels based on a spike in reported faults which followed its implementation of new IIP-compliant measurement systems. Distributors also have the option to apply for exclusion of service performance data adversely affected by anomalous events beyond the distributors control, such as major weather storms.

Telephone service also remains as an important aspect of service. Telephone service is assessed through both speed of response and quality; quality in turn is measured through customer surveys. The size of the penalty/reward is determined by deviation from the group average.

A.2.1.3 Australia – Victoria

Victoria is discussed as it has the most experience with reform in Australia. In general, the regulatory approach in Victoria is similar to that in other states. The commonality of state and national economic regulation in Australia is due in large part to very extensive collaboration between the state and national regulatory agencies which has arisen from the regulatory reform initiated over a decade ago to address Australia's fragmented state system and to improve its economic situation.[23]

Victoria provides a useful example of both a Q-factor and for customer guarantees/rebates. Victoria has had a relatively sophisticated form of CPI-X+S incentive regulation in place since 2000. In its 2000 Electricity Price Determination for the period 2001-2005, the Victorian regulator added an S term to the price control formula giving it the form:

$$\frac{(1+CPI_t)(1-X_t)(1+S_t)}{(1+S_{t-6})}$$

The service adjustment, St, that will apply in year t for a particular distributor is calculated as a percentage according to the following formula:

$$S_t = \sum_{r,n} S_{r,n}(GAP^{r,n}_{t-2} - GAP^{r,n}_{t-3})$$

where:

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[23]See the Utility Regulators Form www.accc.gov.au/utipubreg/pubreg.htm

r refers to the following indicators:
- unplanned interruption frequency (SAIFI)
- unplanned interruption duration (CAIDI)
- planned minutes off supply (SAIDI)

n refers to the following customer categories:
- CBD
- Urban
- Rural

$S_{r,n}$ is the incentive rate for indicator r and customer category n

$GAP^{r,n}_{t-y}$ is the performance gap for indicator r and customer category n in calendar year t-y, i.e. the difference between target and actual performance:

$$GAP^{r,n}_{t-y} = TAR^{r,n}_{t-y} - ACT^{r,n}_{t-y}$$

$TAR^{r,n}_{t-y}$ is the distributor's performance target for indicator r and customer category n in calendar year t-y

$ACT^{r,n}_{t-y}$ is the distributor's actual performance for indicator r and customer category n in calendar year t-y, less the impact of excluded events.

Victoria also has guaranteed service levels and "compensation" as a secondary component of SQR, to compensate customers who, individually, receive poor service. Table A.9 depicts the details of the guaranteed-payment program.

Table A.9: Guaranteed Service Levels in Victoria

Service	Benchmark	Penalty
On-site appointments with customers	<15 minutes late	AUS$20
Starting supply to new customers	On time	AUS$50 for each day late, up to a maximum of AUS$250
Restoring power after interruption	<12 hours	AUS$80
Frequency of interruptions: customers with rural feeders	<15 per year	AUS$80
Frequency of interruptions: all other customers	<9 per year	AUS$80

Unlike in the UK, both frequency and duration of interruptions are addressed, although on a case-specific basis rather than through the application of annual average interruption indices, as in the US. Exceptions are made for such circumstances as announced planned interruptions, momentary interruptions, transmission network failure and major weather events, but one

unusual provision is that customers consuming more than 160 MWh per annum need not be compensated for violations of the supply restoration or interruption frequency benchmarks.

The Victorian scheme was the second to be introduced in Australia. South Australia introduced a somewhat similar but less sophisticated scheme a few years earlier and is currently in the process of reviewing its operation as part of its current price determination. Tasmania has just announced the details of its service quality incentive scheme due to commence in 2004, and Queensland is expected to shortly release a draft report on recommendations for service quality incentives that would apply from July 2005 onward.

A.2.1.4 New Zealand

Enforcement of indicators and standards for distributors in New Zealand falls under the jurisdiction of the New Zealand Commerce Commission, which is in the process of implementing a threshold regulation plan for electricity distribution. Following a series of consultations with stakeholders, the Commission issued a final decision in June of 2003.[24]

Under threshold regulation, the Commission establishes thresholds as screening mechanisms to identify business lines whose performance may warrant further investigation. The Commission has adopted two thresholds to date - a price path threshold and quality threshold - with the goal of giving distribution businesses incentives to maintain service levels while reducing prices in real terms. The Commission had previously considered adopting a profitability threshold but abandoned the proposal on the grounds that it might provide perverse incentives for companies to unnecessarily raise costs.

Both the price path threshold and the quality (reliability) threshold are designed to check that future performance does not deteriorate from that of recent history (i.e. the last five years). The quality component also includes a check that the distributor is making efforts to engage customers in determining their service quality requirements and expectations, including price-quality considerations.

The quality threshold has two criteria:

- no material deterioration in reliability, assessed on actual or annualized SAIDI and SAIFI for planned and unplanned interruptions occurring in the distribution system; and
- meaningful engagement with consumers to determine their demands for service quality.

The first quality assessment is scheduled for the year ending March 31, 2004, and then annually thereafter. Within 40 days of the end of the report period, the firm must submit a confirmation of compliance, signed by at least one director of the board, along with an independent auditor's

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[24]"Regulation of Electricity Lines Business Targeted Control Regime Threshold Decisions", 6 June 2003, www.comcom.govt.nz/electricity/pdfs/FinalThresholdsJune2003.pdf

report. Reliability performance for the first year will be assessed against the historical average for the 5-year period ending March 31, 2003. Progress on customer service quality requirements discussions will be assessed qualitatively. The Commission has not yet declared the procedures for dealing with threshold breaches, but possible courses of action include warnings and administered settlements.

A.2.2 Natural Gas

In the natural gas industry most of the SQIs utilized are similar to the electric utility industry, especially with respect to telephone response time, appointments, and other customer-handling measures. Most of the SQI plans surveyed include financial penalties for poor performance relative to standards, but without corresponding rewards for exceeding standards (or other thresholds). In countries such as the US and UK, where the same utilities frequently provide delivery of both gas and electricity, regulators have often imposed service quality regulation on both products simultaneously (although with possible differences in metrics and mechanics). Thus, the jurisdictions at the forefront of implementing SQR in electricity have also been equally active in promoting service quality among gas distributors. A quick summary of SQIs for natural gas distributors in international jurisdictions is provided in Table A.10.

Table A.10: Selected SQIs for Natural Gas Distributors in Selected Jurisdictions

	Massachusetts	**Washington**	**United Kingdom**	**Australia – Victoria**
Selected SQIs	Response time to odour calls	Customer satisfaction with field services	Time to repair meters	Low pressure incidents
	Lost time due to accidents	Customer satisfaction	Written replies to inquiries	Number of faulty meters
	Call centre response time	Customer satisfaction with call centre	Call centre response time	Call centre response time
	Number of customer complaints	Number of customer complaints	Number of customer complaints	Number of customer complaints
	Bill adjustments	Response time to ...	Speed of refunds	Number of unplanned outages
	Service appointments met	Service appointments met	Service appointments met	Duration of unplanned outages
	On-cycle meter reads	Customer disconnections for non-payment	On-time meter reads	Customer disconnections for non-payment
Penalty	Penalty proportionate to deviation from targets; up to 2% of revenue at stake	Financial penalties up to $7.5M if quality degrades below deadband ranges	Guaranteed compensation for below-standard performance for some indicators, while others are just reported.	Performance made public, but no penalties other than occasional action plans

A.2.2.1 United States

A.2.2.1.1 Massachusetts

One illustrative example from the United States is Massachusetts, where the regulator established PBR and SQIs for Boston Gas in 1997, several years before it compelled the state's electric utilities to accept service quality provisions as a condition of approval of their merger. (See s. A.2.1.1.5)

In addition to placing Boston Gas under an CPI-X price cap with a 2% productivity offset (X-factor), the regulator created a service quality index comprised of seven indicators: response time to odour calls, lost time due to accidents, telephone response time, service appointments met, number of customer complaints, dollar amounts of bill adjustments, and percent of on-cycle meter reads. The degree of deviation from the target levels would determine the amount of the penalty to be levied, up to a maximum of US$700,000 for each category (meaning that US$4.9 million, or 2% of Boston Gas's annual revenues, were at stake).

Two issues that became matters of dispute during the negotiation process hold relevance for the development of any SQR plan. First, Boston Gas resisted the regulator's attempt to benchmark complaints and bill adjustments to the average of other Massachusetts gas distributors, arguing that this would create improper incentives. The regulator ultimately agreed, switching the point of reference to Boston Gas's own three-year rolling average performance, and permitting a deadband, in which no penalty would be assessed, of 10%.

The two entities also debated over the appropriate historical time frame to use as the benchmark. (This can have a critical influence on the success or failure of the SQR plan, as choosing a year with abnormally poor performance as the "baseline" can allow the company to fulfill its obligation with ease. It must also be considered whether to use actual past performance as the direct standard, or to expect some improvement above the historical level, to reflect technological and management innovation as well as operational flexibility considered to result from adoption of PBR.)

A.2.2.1.2 Washington State

Around the time when the SQR plan for Boston Gas was being devised, a state regulator on the opposite coast was formulating a similar proposal as a condition for approving the merger between Puget Sound Power & Light and Washington Natural Gas in 1996. The newly-formed Puget Sound Energy would be liable for up to US$7.5 million in annual penalties should service deteriorate significantly below benchmark levels on ten different indicators. These measures include several forms of customer satisfaction, number of complaints, response time to gas emergencies, appointments kept, and customer disconnections. Satisfaction with field services, the call center, and overall performance is gauged through an annual survey conducted by an independent agency. Such surveying constitutes the most direct way of assessing quality of service relative to actual customer expectations (perhaps the most important driver of any SQR

plan), even if such survey instruments are not cheap. During 2000, the company attained its benchmark levels on nine of the ten indices, with its performance on the tenth sufficiently close to the target that no penalty was imposed.

A.2.2.2 United Kingdom

In the UK, performance standards applicable to the gas delivery industry are analogous to the "pay-as-you-violate" standards binding on electricity distribution companies, but the potential payouts are lower in magnitude. As a condition of British Gas's license to supply gas, it is required to compensate customers for missed appointments, missed meter reads, or missed meter appointments requested by the customer. The company must also report on an annual basis its performance with respect to 21 other service quality indicators (ranging from complaints to telephone answering to billing problems), but these involve no customer compensation for substandard performance.

Although Ofgem has the statutory authority to impose financial penalties for breaches of license conditions or performance standards over and above any customer compensatory payments, British Gas has met or exceeded the standard for every indicator in each of the last three years.

A.2.2.3 Australia – Victoria

The service quality system in place in Victoria (Australia) emphasizes informational disclosure rather than financial punishment. Each gas supply company must publish on a quarterly basis its performance on a variety of SQIs, including unplanned outages, low pressure incidents, customer complaints, telephone response time, customer disconnections for non-payment, and number of reported faulty meters. The results for each company are presented to the public by the regulator for comparative purposes, and also used by the regulator itself to identify chronic weaknesses of the operational performance of particular companies relative to their peers.

A.2.3 Water

Among the traditionally regulated industries, the water sector has witnessed the least application worldwide of service quality regulation. This is presumably because customers have fewer issues with the customer service and reliability exhibited by their water suppliers than by their other utilities, since regulatory policy is in large part driven by public opinion and the ensuing political pressure. It may also reflect the fact that water supply is usually provided as a utility operation of a government agency, and is subject to traditional economic regulation to a lesser degree than are sectors such as electricity, natural gas and telecommunications.

Although water quality has historically prompted a large number of complaints from end-users, this sector is typically overseen by environmental and municipal authorities rather than by a rate-setting regulator. However, the few water SQR regimes currently in operation emphasize similar objectives to their counterparts in electricity and gas. This is shown by the summary in Table A.11.

Table A.11: SQIs for Water Utilities in Selected Jurisdictions

	United Kingdom	Edmonton	Australia – Victoria
Selected SQIs	Incidence of low water pressure	Low water pressure	Customer satisfaction
	Unplanned interruptions	Planned interruptions	Response time to complaints
	Sewer flooding	Water quality	Water quality
	Response time to complaints	Water main break frequency and duration	Supply interruption duration and frequency
	Response to billing inquiries	Customer satisfaction	Number of customer complaints
	Percent of estir ed bills	Labour safety	Employee sick time and lost time due to injury
	Call centre response time	Environmental protection	Call centre response time
Penalty	Guaranteed payments to customers for violations, plus a recent adjustment to the price cap for overall performance.	Formulaic penalties, with each index point below the target bringing a penalty of $53,000, up to a maximum of 5% of net income.	Performance is published; major breaches can result in penalties due to licence agreements

A.2.3.1 United Kingdom

Perhaps the most extensive water SQR plan is administered by the UK regulator Ofwat. Since the industry was restructured and privatized in 1990, Ofwat has monitored the performance of the UK's water suppliers across a number of dimensions, and issues an annual report evaluating each company's service quality relative to both the average of its peers and its own past performance. There are currently ten indicators reported, including incidence of low water pressure, unplanned interruptions, sewer flooding, response time for billing inquiries and complaints, percent of estimated bills, and telephone response time. Similar to the regime applicable to UK electric and natural gas utilities, water companies must compensate customers for each instance of failing to meet pre-established targets.

Following consultations with customers in 1999, Ofwat decided to increase these per-incident payments by more than double while in some cases tightening the thresholds at which payments are triggered, which boosted payouts from £2,400 in 1999 to £16,300 in 2000. (This illustrates the importance of gathering customer feedback regarding the adequacy of SQIs and associated thresholds vis-à-vis their true valuation of service quality, and incorporating that information into periodic revisions. Otherwise, companies might deliver too high or too low a level of quality, and their compensatory payments might be disproportionate to the actual "disutility" suffered by customers.)

Also in 1999, Ofwat factored service quality performance into its price control reviews of the water companies, adjusting each company's allowed revenues by up to 0.5% in either direction

depending upon its performance relative to its peers. While this explicit benchmarking again raised protests over comparability and creating improper incentives, the revenue adjustments were implemented as initially specified.

A.2.3.2 Australia – Victoria

As in its dealings with gas suppliers, Victoria's regulatory agency has adopted a relatively light-handed approach to regulating service quality of the water companies. This is essentially an application of the philosophy that competition to enhance service quality will be stimulated by simply publishing the comparative performance of each company, without having to resort to "carrot and stick" approaches. Companies must record and report their performance on a range of measures, which were revised slightly in 1996 based on input from interested parties. These indicators include customer satisfaction, complaints, response to complaints, telephone response time, supply interruption duration and frequency, water quality, sewer blockages and spillages, and employee sick days and lost time due to injury. Although "non-trivial" breaches of standards embodied in each company's license can expose it to significant penalties, in practice these provisions are seldom invoked.

A.2.4 Telecommunications

In contrast with the water sector, the telecommunications industry has been subjected to widespread and intensive service quality regulation, particularly in North America. Many US states have introduced innovative rate programs with service quality adjustment mechanisms to keep local telephone carriers in line. This may be attributable to the fact that a functional and reliable telephone network is often an immediate and pressing need, particularly with respect to operator and emergency services. Early experience with SQIs in telecommunications suggests that regulators chose too many parameters for monitor, resulting in onerous reporting. As with the other industries reviewed in this section, many of the indicators commonly reported by telecom firms have analogues in the electricity sector, as is evident in the case study summary in Table A.12.

Table A.12: Selected SQIs for Telecommunications Companies in Selected Jurisdictions

Indicator	Maine	Rhode Island	Oregon	Canada
Selected SQIs	Percentage of calls blocked due to congestion	Directory Assistance answer time	Network blockage	Dial tone delay
	Service appointments met	Service appointments met	Number of held orders	Installation appointments met
	Number of Held Orders	Time to complete new installations	Duration of held orders	Number of held orders
	Call centre response time	Repair service response time	Call centre response time	Business office telephone service factor
	Service outages	Time out of service	Repair centre telephone response time	Customer complaints
	Number of customer complaints	Repeat trouble reports	Repeat trouble report rate	Timely switching of long distance supplier
	Number and duration of trouble reports	Number of trouble reports	Trouble report rate	Trouble report rate
Penalty	Customer rebates proportional to deviation from targets, up to 3.4% of total retail revenues	Price cap is adjusted downward based on a company's grade on the quality "scorecard"	Penalties either credited to customers monthly or invested in action plans (at the regulator's discretion)	Remedial action reports for below-std. performance; financial penalty mechanism tied to service performance as component of second generation PBR (price cap)

A.2.4.1 United States

A.2.4.1.1 Verizon – Maine

One effective example of service quality regulation is provided by Maine, which in 2001 renewed its Alternative Form of Regulation (AFOR) for Verizon. AFOR was initially created in 1995. During its formal review of the SQIs contained in the AFOR, the regulator decided to eliminate four indicators, modify four others, and introduce five new indices, based on an assessment of the cost-effectiveness of existing indicators and standards and an identification of the need for new ones. Furthermore, the caps on total penalties for each indicator were increased such that total customer rebates can reach to 3.4% of Verizon's total retail revenues in Maine. These revisions, which were based partially on internal reviews and partially on comments solicited from Verizon and other interested parties, suggest the importance of periodic reviews of the efficacy of SQIs and their associated penalty structures.

For those indicators that were retained from the original AFOR, the baseline targets (rolling averages of 1992-94) were also retained, since the regulator felt that the objective was to, at a

minimum, uphold the level of service that had been achieved under rate-of-return regulation. While this is reasonable in light of the regulator's goal, it fails to incentivize improvements in performance (due to operational and technological advancements). The updated battery of SQIs approved in 2001 included the following: appointments kept, held orders, call center response time, trouble reports, average duration of troubles, customer complaints, service outages, dial-tone speed, and percentage of blocked calls due to network congestion. Customers receive automatic rebates when any of these norms are violated, and Verizon must produce quarterly reports of its quality outcomes relative to the targets.

A.2.4.1.2 Verizon – Rhode Island

Verizon is also subject to a markedly different quality of service plan in Rhode Island, first implemented in 1996 (when the company was known as NYNEX). Each month the regulator computes an index that represents a "scorecard" of Verizon's aggregate performance on a variety of indicators, including: time to complete new installations, missed appointments, time out of service, repeat repair reports, repair service response time, directory assistance answer time, and customer trouble reports. For each index, Verizon can receive three different grades depending upon its performance relative to two thresholds. For example, if it misses under 2.5% of appointments, it receives 2 points; if it misses between 2.5% - 3.5% of appointments, it receives 1 point; otherwise, it receives 0 points. Once these scores are measured and tallied up, Verizon is considered to have passed if it earns at least 25 out of the possible 42 points. For each of the 12 months prior to the annual rate filing in which Verizon fails to pass this threshold, its CPI-X price cap is adjusted downward by 0.0417%, thus implying a total potential annual revenue adjustment of (0.5%).[25] While this impacts the P_0 for the following year, it does not carry through to subsequent years (unless the performance deficiencies continue). Clearly this approach has a more scientific appearance than most, but it permits Verizon considerable latitude in trading off between different aspects of service quality provided it sustains the requisite 25 points in aggregate.

A.2.4.1.3 Qwest – Oregon

Oregon's approach to regulating US West (now Qwest) and other local telecom carriers resembles that of Maine, as the state's regulatory commission developed minimum service quality standards in response to the dictates of a state senate bill passed in 1999. On a quarterly basis, carriers must report their performance relative to standards for the following indicators: number and duration of held orders, trouble report rate, resolution of trouble reports, network blockage, and call center response time. Each indicator has a corresponding financial penalty amount, whose relative size (presumably) reflects how customers value that particular element of service quality. But rather than compensatory payments to individual customers, these penalties are large monthly amounts (on the order of US$10,000 to US$25,000) that are either rebated in the form of bill credits or directed by the commission into targeted investments to address

[25]This in fact is a Q-factor (see Section 3.1.5).

service quality shortcomings. As with many SQR plans elsewhere, Oregon has placed a ceiling on total annual penalties equaling 2% of the carrier's gross intrastate sales revenues.

A.2.4.1.4 The FCC's ARMIS reporting

On a national basis, US telcos must also report their service performance (along with financial, infrastructure, and operational data) as part of the Federal Communication Commission's ("FCC") Automated Reporting Management Information System ("ARMIS") requirements. ARMIS Report 43-05 deals with the reporting of service quality indicators. Customer satisfaction, from surveys conducted with customers, is contained in ARMIS Report 43-06. ARMIS Report 43-07 deals with network infrastructure, and provides information on network and technology investments, including those related to service improvements. As local telecommunications is regulated at the state level, the FCC ARMIS reports are largely a monitoring requirement. However, the data is publicly available from the FCC (through its web site) allowing for comparisons between telcos and across states, and the ARMIS data requirements may have largely influenced service quality monitoring by state regulators.

A.2.4.2 United Kingdom

In addition to being an early adopter of PBR (in 1984), the UK telecommunications industry, regulated by Oftel, adopted service quality regulation early on. (The telecom industry was the first network based industry reformed in the UK, and served as the prototype for subsequent reform in other industries, including natural gas and electricity.) It has evolved over time. Reported measures are, to a large extent analogous to those reported in Canada and the U.S.

One characteristic unique to U.K. has been the evolution of consistent service performance measurement and reporting between the cable and telecommunications industries, and even, where relevant, between wireline and wireless communications. This recognizes similarities and increasing convergence, substitution and competition between these sectors and network technologies.

The UK was also a frontrunner in promoting publication of service performance. This was viewed as being useful for public education (to allow consumers to see how their cable or telephone company performed relative to others) and to motivate service improvements due to "peer pressure" resulting from such publication. Service guarantees (rebates) for poor or missed service performance, with respect to an individual service experience (such as a missed installation or repair appointment) are a standard part of UK regulation. As the telecommunication reform in the U.K. preceded electricity reform by several years, it was the leader of the use of service quality regulation for education and service improvement. Similar strategies have also been subsequently adopted in electricity, natural gas and water. In fact, a key lesson from the U.K. is how regulatory strategies can be applied to different sectors (while recognizing the differences in the products/services and industry structures).

A.3 Putting Ontario's Electricity Distribution SQIs on the International Map

This final section the current Ontario SQIs in relation to the survey of service quality regulation for electricity distribution as practiced around the world. This is done by compiling the following inventories characterizing the SQIs for electricity distribution currently monitored in other jurisdictions. There are two inventories, summarized in two tables. Table A.13 indicates the usage of Ontario's SQI measures in other jurisdictions while the second, Table A.14, focuses on several indices not currently monitored by Ontario but which are commonly monitored elsewhere.

Table A.13: Inventory of Selected Worldwide use of SQIs Monitored for Ontario LDCs

Jurisdiction	New Service Connections	Underground Cable Locates	Appointments Met	Telephone Accessability	Written Responses to Inquiries	Emergency Response	SAIDI	SAIFI	CAIDI
Ontario	•	•	•	•	•	•	•	•	•
California	•		•	•			•	•	
Colorado				•			•		
Delaware							•	•	•
Illinois							•	•	•
Kansas							•	•	•
Maine	•			•	•			•	•
Massachusetts	•		•	•			•	•	
Mississippi							• •		
New York	•			•				•	•
Ohio							•	•	•
Oregon							•	•	•
Pennsylvania							•	•	•
Texas							•	•	•
Vermont	•			•				•	•
West Virginia	•					•			
Wisconsin							•	•	•
United Kingdom		•	•		•	•	•	•	•
Australia (Victoria)	•		•			•		•	
New Zealand							•	•	•

Note that this table covers selected jurisdictions only; it is not meant to be an exhaustive survey.

As suggested by the numerous checkmarks in Table A.13, the reliability indices measured in Ontario (SAIDI, SAIFI, and CAIDI) are the three most commonly reported reliability metrics

worldwide with, in particular, SAIDI and SAIFI being monitored in at least 30 US states. Ontario's indicators for assessing new service connection time, on-time appointment rates, and call center responsiveness, are also fairly common. For example, its requirement that incoming calls be handled by a person within 30 seconds matches exactly the monitored performance found in several other jurisdictions (although the minimum acceptable standard may vary). By contrast, the remaining three Ontario indicators (underground cable locates, written response to inquiries, and emergency response) are less common internationally, although analogous measures are tracked in several of the jurisdictions surveyed.

As shown in Table A.14, there are several indices of service quality not currently monitored in Ontario but that are frequently monitored by regulators worldwide. One fairly common practice involves utilities periodically reporting the worst-performing circuits in their network, with accompanying explanations. This information is often reviewed jointly by the regulator and utility to formulate a remedial action plan for network reinforcements and upgrades – with particular emphasis on improving reliability on the identified "worst performers".

Table A.14: Inventory of selected SQIs monitored internationally (excluding Ontario LDCs)

	MAIFI	Customer or PUC complaints	Billing or meter read accuracy	Worst Circuits	Losses	Power Quality	Customer Satisfaction	Safety/ Health
Ontario								
California	•						•	•
Colorado		• •						
Delaware				• •				
Maine		•					•	
Massachusetts		•	•	•	•		•	•
Mississippi							• •	
New York			•	•		•	•	•
Oregon				• •				
Texas				• •				
Vermont		•					•	•
West Virginia		•	•			•		•
United Kingdom			• •					
New Zealand					• •			

Note that this table covers selected jurisdictions only, and is not intended to be an exhaustive survey.

Perhaps the most direct means of ascertaining customers' opinions regarding their electricity distributor's performance are tracking the number of complaints per 1,000 customers and surveying customer satisfaction. Both of these methods are applied in a number of sampled jurisdictions. Billing accuracy and metering timeliness are also issues with profound impacts on customer welfare, and thus measurements of these figure into several SQR regimes worldwide.

MAIFI is recorded by a number of utilities, but is rarely subjected to service quality incentives, perhaps suggesting that regulators perceive momentary outages as often being beyond a utility's immediate control.

Based on an extensive review of SQR plans worldwide, the SQIs currently reported in Ontario are generally consistent with common indicators in electricity and analogous network-based industries elsewhere. In addition to Ontario's indicators, several other indicators, such as a momentary interruptions and a survey-based measure of customer satisfaction, are frequently incorporated into service quality regulatory schemes, since they relate fairly directly to customer welfare.

However, there is merit to keeping the indicators straightforward to measure, and limited in number, to allow distributors to focus on the most important aspects of service quality while minimizing costs and burden of data collection and regulatory oversight, which can often outstrip the potential benefits to customers.

Many SQR regimes elsewhere invoke financial penalties for violations of standards, although care must be exercised in establishing the penalty amounts to ensure that they exceed the cost of compliance while also having some approximate correspondence with customers' valuation of each aspect of service, and the associated acceptable performance level.

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